Preliminary Drainage Report for Monarch Landing Addition
Wichita, Sedgwick County, Kansas

Location

The site is located in unincorporated Sedgwick County, with anticipated annexation by the City of Wichita, Kansas. The site is in the Southeast Quarter of Section 1, Township 29 South, Range 2 East or more commonly the northwest corner of 159th Street East and 21st Street North. Undeveloped land borders the site to the north, east, and west. The total site area is approximately 122 acres. The site is shown on the Quadrangle Map located in Appendix A.

Soils

Soils in the Monarch Landing Addition have been classified as Rosehill silty clays, 1 to 3% slopes Goesell silty clay 0 to 1% slopes and according to the NRCS (SCS) Sedgwick & Butler County Soils Survey (Appendix B). The HSG used to select runoff coefficients is "D".

Pre-Project Conditions

Development

The site is undeveloped open space. The primary land use is agricultural.

Landform and Slope

Slopes across the site range from 1-5%. The site drains to all sides of the proposed site from the top of the hill near the center of the site. Elevations across the site range from 1376 in the center of the site to 1364 on the south side of the project site at the culvert crossing under 21st Street North.

Drainage Conditions

The site is not located in any designated floodplain according to the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map (FIRM). The site is shown in Zone X, areas outside of 100-year flooding. FIRM Panels 200321 0150A Sedgwick County, Kansas & 200037 0165C Butler County, Kansas, unincorporated area, June 3, 1986 & June 20, 2001, Appendix C.

Runoff Characteristics

Basin A drains 38.1 acres south into an engineered swale running parallel to 21st Street North then south offsite through an existing 3x4 RCB culvert under the road.

Runoff from basin B drains 34.0 acres to the west into an SCS waterway west of the site near the northwest corner of the school parcel.

Basin C includes 36.9 acres that flow offsite to the north into an SCS waterway north of the site.

Basin D includes 13.1 acres that flow offsite to the east near the section's east quarter corner. Current facilities include a 12" CMP under 159th Street (unpaved).

Basin E includes 9.7 acres that flow from the site's southwest corner into a ditch parallel to 21st Street North.

The existing basin boundaries are shown in Appendix D.

The five pre-project basins were analyzed in Hydraflow Hydrographs 2004. The drainage basins were modeled using the SCS Method with a 24-hour Type 2 design storm. The basin was modeled to represent the undeveloped conditions using a curve number of 80. Time of Concentration was calculated using the FAA method in an Excel Spreadsheet, Appendix E.

Calculations of the pre-project runoff for each watershed can be found in Appendix F. Pre-project flows from the site are shown in Table 1.

Table 1: Pre-Project Runoff.

Description	Design Storm Flows (cfs)			
	2-Yr	**5-Yr**	**10-Yr**	**100-Yr**
A	34.0	53.2	66.2	115.3
B	24.5	38.2	47.6	83.0
C	37.2	58.1	72.3	126.3
D	15.7	24.4	30.3	52.9
E	11.7	18.2	22.6	39.5

Developed Conditions

Development

The site will be developed for residential use with 1/4 acre and 1/3 acre lots. The southwest corner of the project site is proposed for an elementary school and the south east corner of the site will be zoned for commercial use. Detention will be provided in appropriate areas of the site.

Landform and Slope

Developed slopes will be 0.5% minimum and 3:1 maximum in the detention ponds. A preliminary grading plan is included in Appendix G. Final elevations of the lots will also be determined during final design.

Drainage Conditions

Watershed boundaries at the site will change slightly as the area is developed. The proposed basin boundaries are shown on the Drainage and Utility Plans in Appendix H. The total of the overall basin areas will be the same area as pre-project conditions. Detention ponds will be provided to keep post-project flows at or below the pre-project flows at each discharge location.

Calculations of the post-project runoff for each major watershed can be found in Appendix F and peak flow rates for each watershed are shown in Table 2.

Table 2: Post-Project Runoff.

Description	Design Storm Flows (cfs)			
	2-Yr	**5-Yr**	**10-Yr**	**100-Yr**
A	33.4	47.9	58.7	109.6
B	21.7	35.3	43.1	69.9
C	33.1	50.1	61.5	118.4
D	12.2	17.7	21.3	34.4
E	10.5	14.1	16.5	24.9

Runoff Characteristics

Watershed A has been divided into 3 sub-basins in the post-project conditions. Watersheds A1 and A2 flow into separate detention basins designed to keep peak flow rates after full development at or below the pre-project values. The detention ponds will discharge to the south into temporary ditches across the future commercial phase parcel to the culvert under 21st Street.

Discharges south of 21st Street from Watershed A will be controlled by the detention facilities rather than by the existing culvert. Proposed improvements to 21st Street will include enlarging the culvert to allow predictable tailwater conditions for the detention facility discharge structures.

Drainage Basin B has been separated into two sub-basins. Watershed B1 in the residential area will be oversized to reduce detention requirements on the school property. A small dry detention facility (B2) will be provided to reduce peak flow rates from the school property and a portion of the residential area so that the combined discharge to the SCS waterway west remains at or below current values for the range of design storms considered.

Drainage Basin C has been broken into two sub-basins to separate areas that will flow to the detention facility from those that will leave the site without detention under the post-project drainage patterns.

Drainage Basins D and E will leave the project site without detention. Watershed areas for these basins have been reduced so that the post-project peak flow rates remain at or below current values for the range of design storms considered.

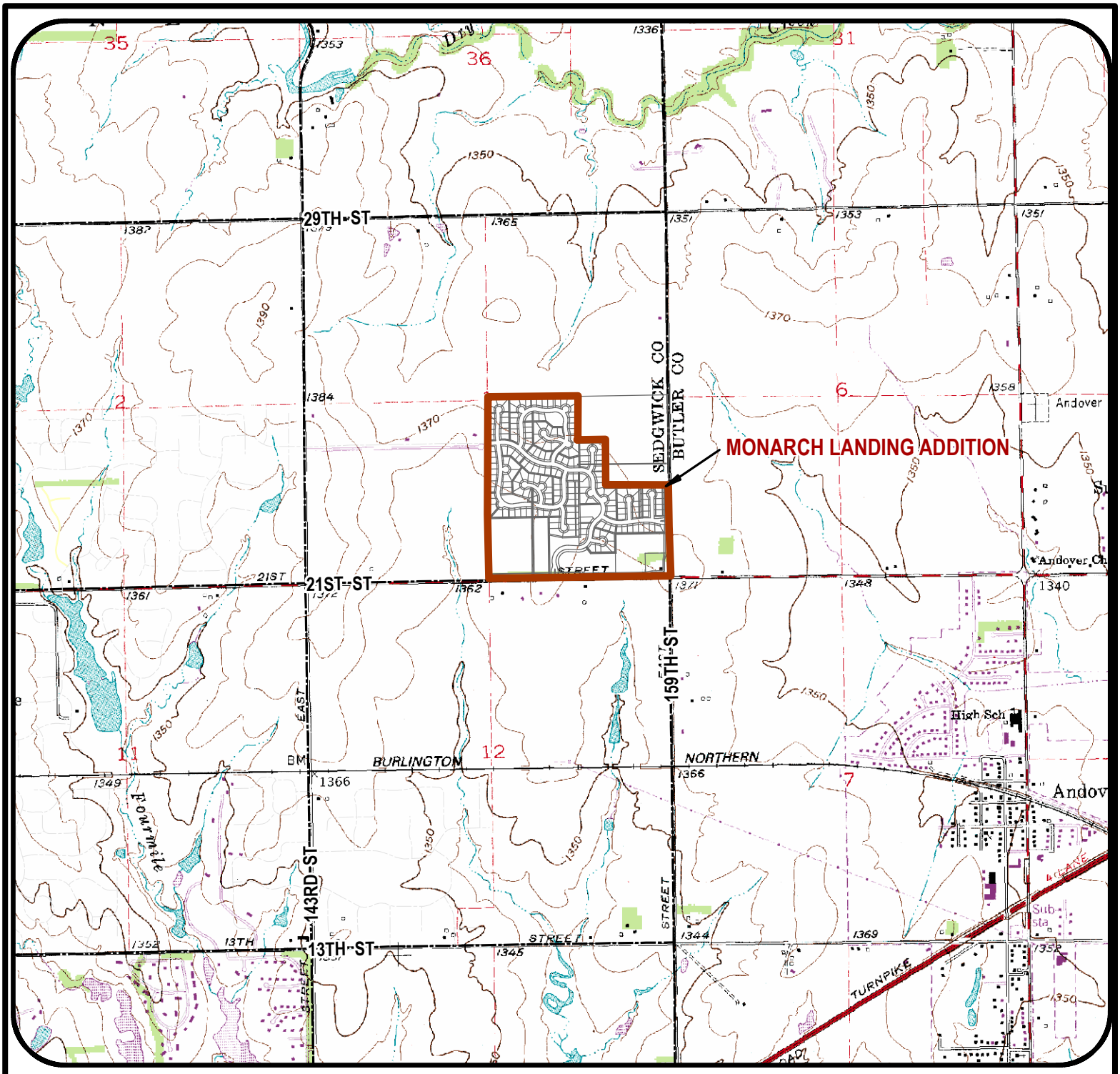
The detention areas were modeled in Hydraflow Hydrographs and have been sized for the 100-year event. Calculations for each pond can be found in Appendix F. A stormwater sewer system (SWS) layout has also been designed to carry site runoff to each of the detention basins. The SWS pipe sizes will be designed at a later stage in the design process.

Appendix H shows the utility plan.

Summary

The 122 acre site will develop as residential lots, commercial/office space and an elementary school. Detention ponds will be used to keep the discharge from each watershed below the pre-project levels. Minimum pads will be established based on the 100-year water surface elevation on the final plat. Storm water sewer for residential areas of the site will be sized to carry the 2-year design event.

Appendix A
Quadrangle Map



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MONARCH LANDING ADDITION

Project Name:

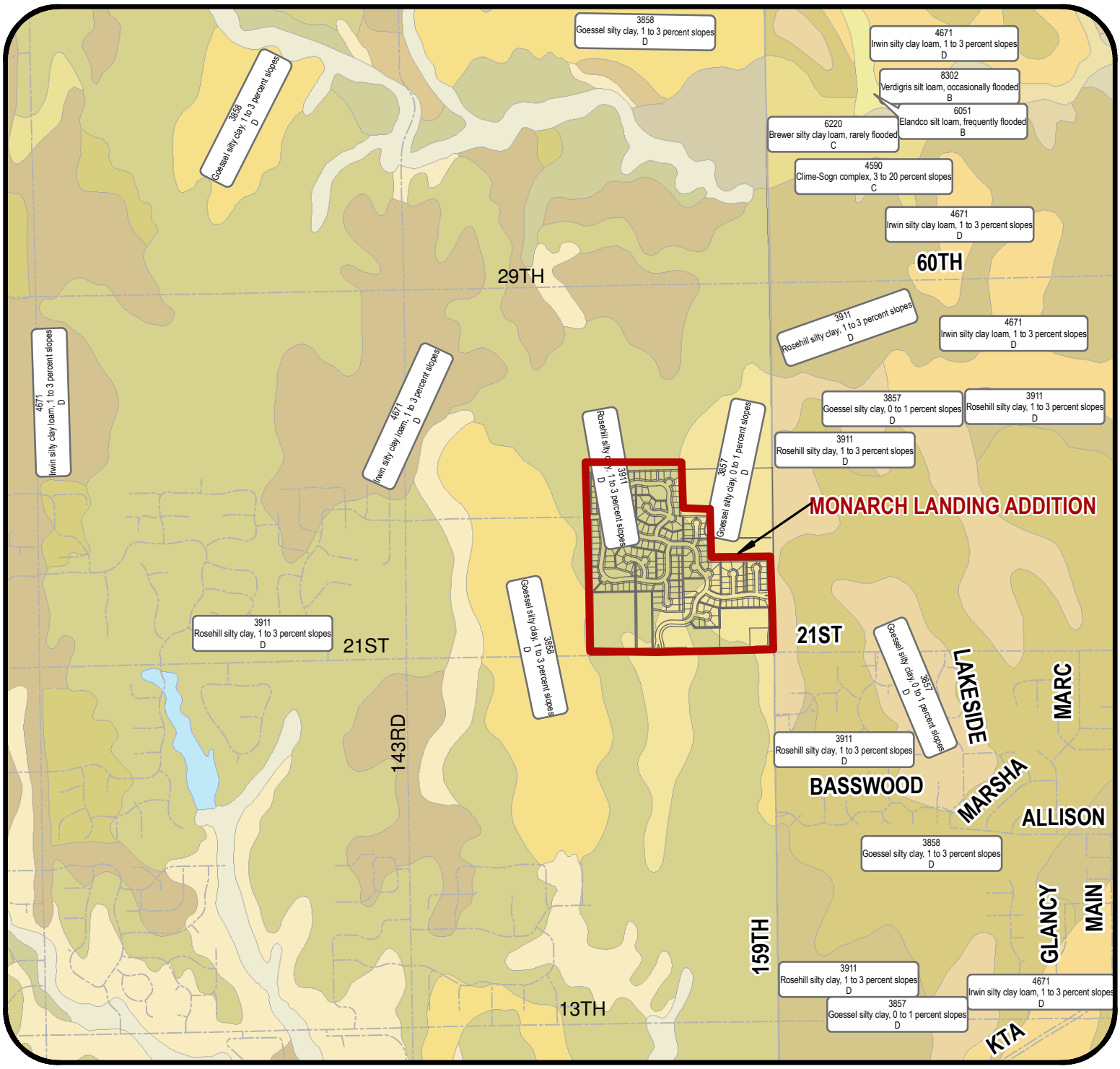
USGS - Sedgwick & Bulter County, KS

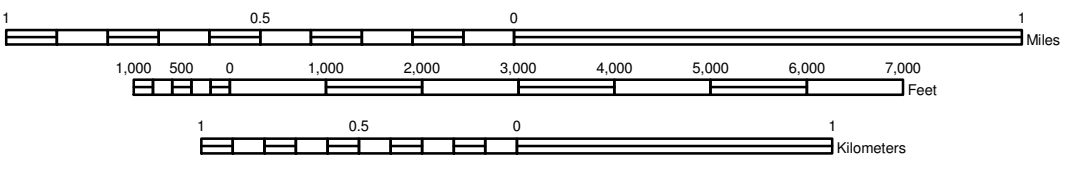
Sheet Title:

MKEC ENGINEERING CONSULTANTS, INC.

KWS	SEPT. 2006
Drawn By:	Date:
TM	06201
Design / Review:	Job No.:

Appendix B
NRCS Soils Map





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MONARCH LANDING ADDITION

Project Name:

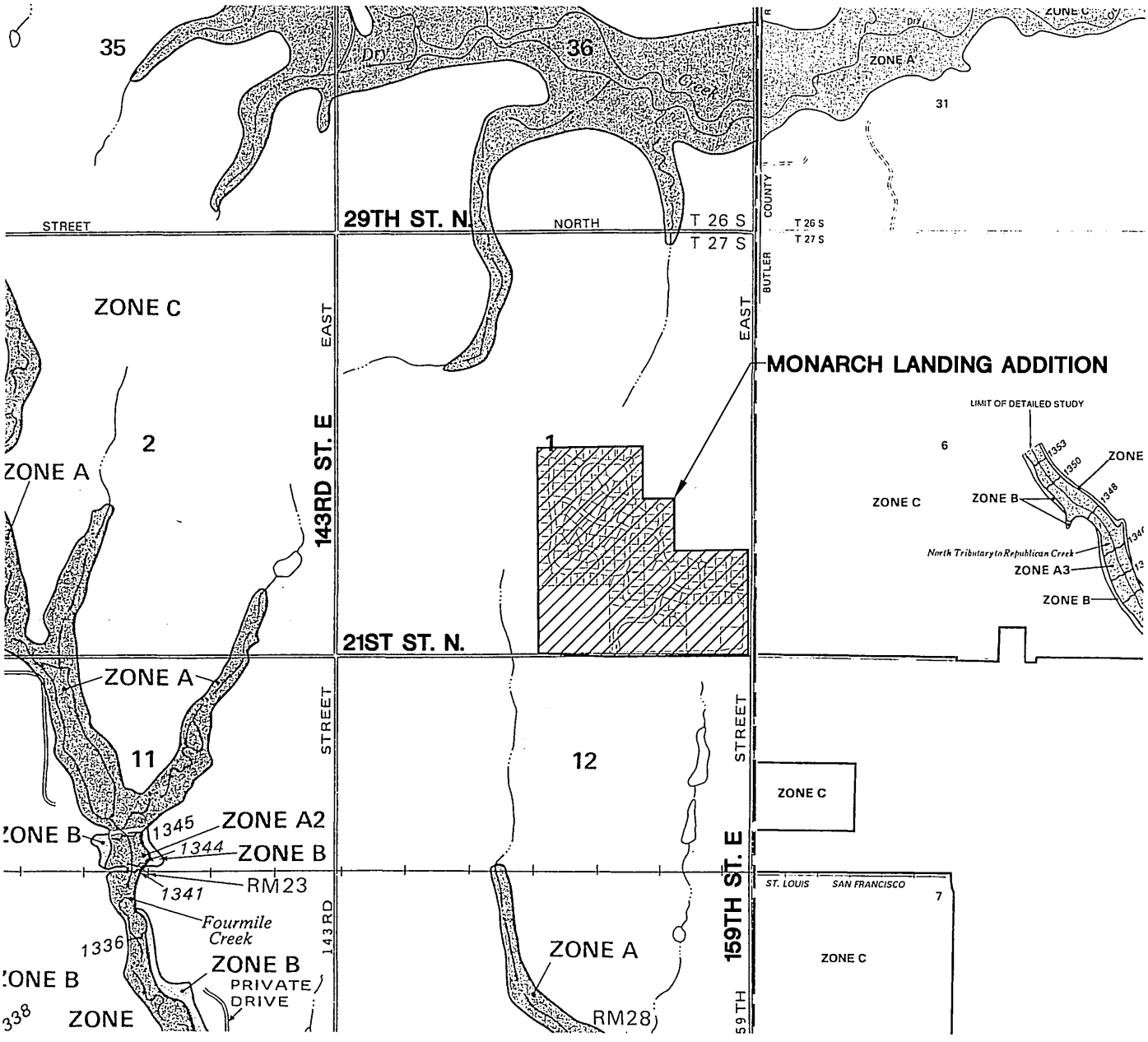
Soil Survey - Sedgwick & Bulter County, KS

Sheet Title:

MKEC ENGINEERING CONSULTANTS, INC.

KWS	SEPT. 2006
Drawn By:	Date:
TM	06201
Design / Review:	Job No.:

Appendix C
Flood Insurance Rate Map (FIRM)
&
Flood Boundary Hazard Map (FBFM)



NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

SEDGWICK COUNTY, KANSAS
(UNINCORPORATED AREAS)

PANEL 150 OF 300

COMMUNITY-PANEL NUMBER
200321 0150 A

EFFECTIVE DATE:
JUNE 3, 1986

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

BUTLER COUNTY, KANSAS
(UNINCORPORATED AREAS)

(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
200037 0165 C

MAP REVISED:
JUNE 20, 2001

Federal Emergency Management Agency

N

APPROXIMATE SCALE
2000 0 2000 FEET

MKEC ENGINEERING CONSULTANTS, INC.
411 N. WEBB ROAD
WICHITA, KS. 67206
316 - 684 - 9600

MONARCH LANDING ADDITION
PROJECT NAME

FIRM MAP
SEDGWICK & BUTLER COUNTY, KANSAS
SHEET TITLE

AJK	KWS	TM
DESIGN BY:	DRAWN BY:	CHECKED BY:

SEPTEMBER 2006	06201	1 / 1
DATE	JOB NO.	SHEET/OF

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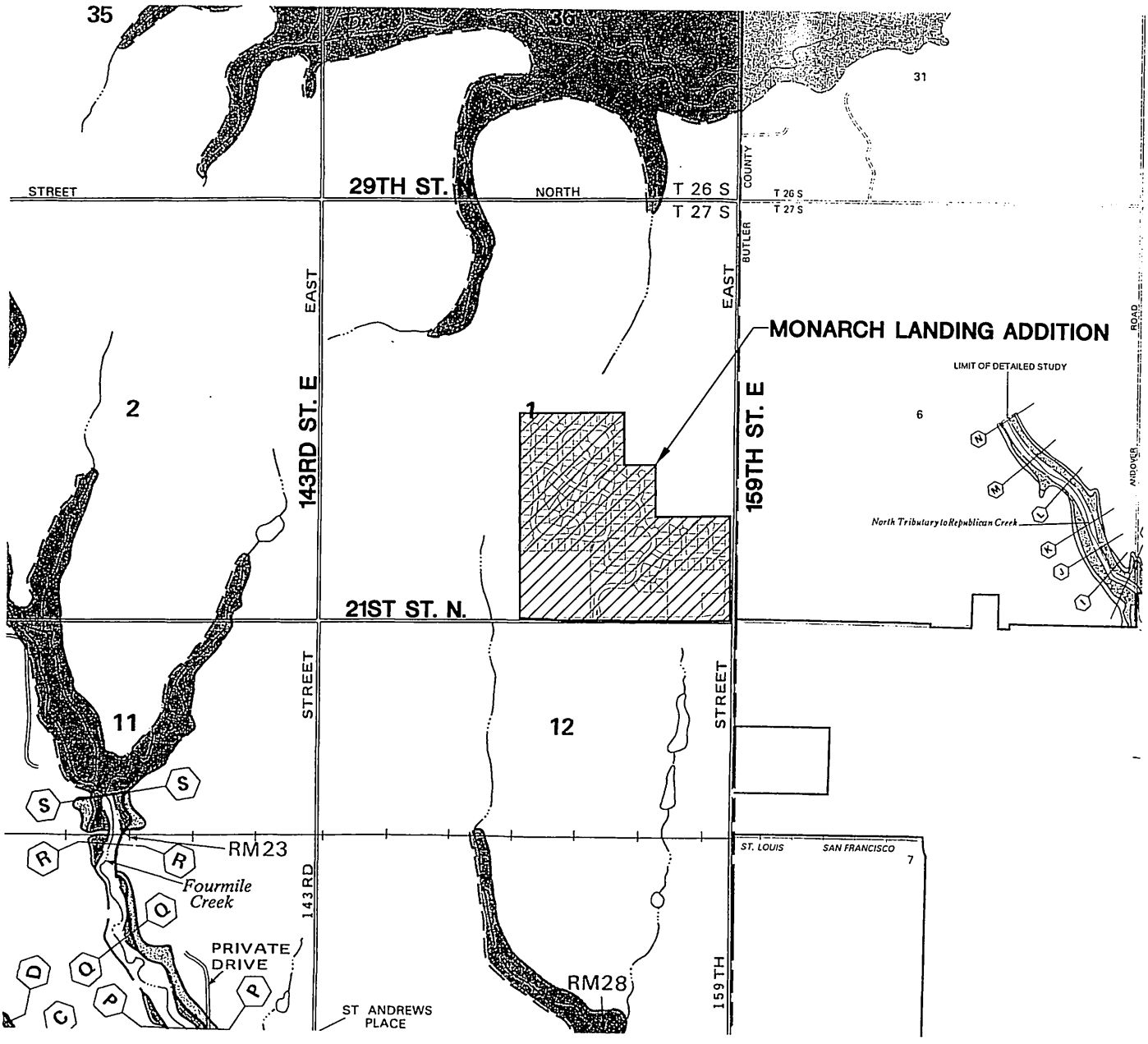

NATIONAL FLOOD INSURANCE PROGRAM

FLOODWAY
FLOOD BOUNDARY AND FLOODWAY MAP

SEDGWICK COUNTY, KANSAS
(UNINCORPORATED AREAS)

PANEL 150 OF 300
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
200321 0150

EFFECTIVE DATE:
JUNE 3, 1986

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

FLOODWAY
FLOOD BOUNDARY AND FLOODWAY MAP

BUTLER COUNTY, KANSAS
(UNINCORPORATED AREAS)

PANEL 165 OF 375
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
200037 0165

MAP REVISED:
JUNE 20, 2001

Federal Emergency Management Agency

APPROXIMATE SCALE
2000 0 2000 FEET

MKEC ENGINEERING CONSULTANTS, INC.
411 N. WEBB ROAD
WICHITA, KS. 67206
316 - 684 - 9600

MONARCH LANDING ADDITION
PROJECT NAME

FBFM
SEDGWICK & BUTLER COUNTY, KANSAS
SHEET TITLE

AJK	KWS	TM
DESIGN BY:	DRAWN BY:	CHECKED BY:

SEPTEMBER 2006	06201	1 / 1
DATE	JOB NO.	SHEET/OF

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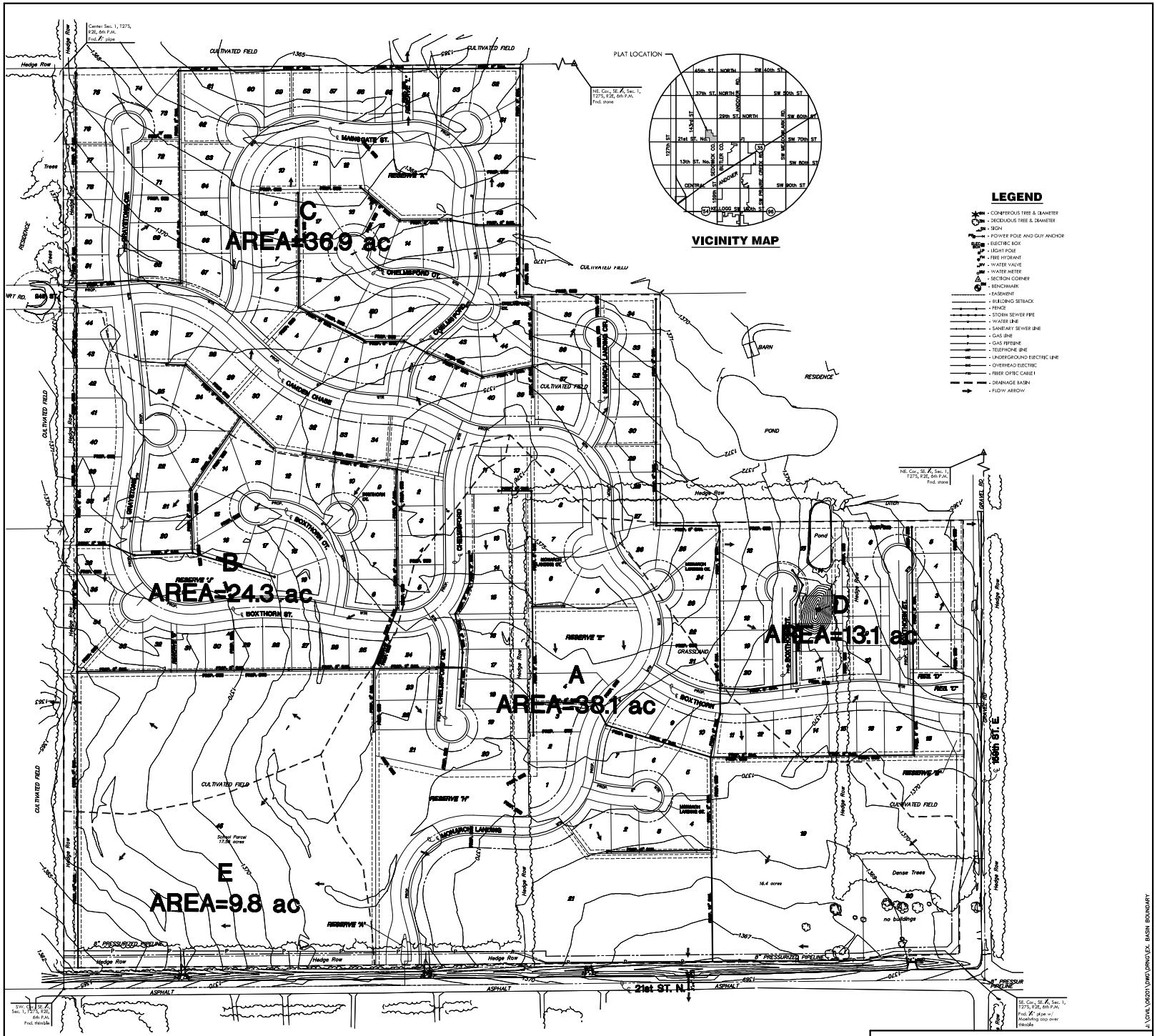
Appendix D
Existing Drainage Boundaries Drawing



MKEC ENGINEERING CONSULTANTS, INC.
411 N. WEBB ROAD
WICHITA, KS. 67206
316 - 664 - 9600

MONARCH LANDING ADDITION
PROJECT NAME

APPENDIX D
EXIST. BASIN BOUNDARIES
SHEET TITLE

TM	KWS	GJA
DESIGN BY:	DRAWN BY:	CHECKED BY:

SEPTEMBER 2006	06201	1 / 1
DATE	JOB NO.	SHEET NO.

J:\CIVIL\06201\DWG\DRNG\EX. BASIN BOUNDARY

Appendix E
Time of Concentration Calculations

Time of Concentration Calculations by the FAA method

Monarch Landing Addition

Project Number *0601010201-0300*

$$T_c = \frac{(1.1-C)L^{1/2}}{100\ S^{1/3}}$$

Area Name	Land Use	Soil Group	Maximum Elevation	Minimum Elevation	Flow Length (L)	Rational Runoff Coefficient, C				Time of Concentration (min), T_c				Time of Concentration (hr), T_c				CN
						2-Year	5-Year	10-Year	100-Year	2-Year	5-Year	10-Year	100-Year	2-Year	5-Year	10-Year	100-Year	
PRE DEVELOPMENT																		
005 - A	*Agricultural - Pasture - Slopes 1-4%*	*D*	*1376.3*	*1364.0*	*1799*	0.32	0.37	0.47	0.67	67.6	63.3	54.6	37.3	1.1266	1.0544	0.9099	0.6211	80.0
010 - B	*Agricultural - Pasture - Slopes 1-4%*	*D*	*1376.3*	*1364.5*	*1505*	0.32	0.37	0.47	0.67	59.1	55.3	47.7	32.6	0.9845	0.9214	0.7951	0.5427	80.0
035 - C	*Agricultural - Pasture - Slopes 1-4%*	*D*	*1372.0*	*1364.0*	*1320*	0.32	0.37	0.47	0.67	60.3	56.4	48.7	33.2	1.0046	0.9402	0.8114	0.5538	80.0
045 - D	*Agricultural - Pasture - Slopes 1-4%*	*D*	*1375.5*	*1364.0*	*1177*	0.32	0.37	0.47	0.67	48.5	45.4	39.2	26.8	0.8090	0.7572	0.6534	0.4460	80.0
050 - E	*Agricultural - Pasture - Slopes 1-4%*	*D*	*1372.0*	*1363.0*	*985*	0.32	0.37	0.47	0.67	45.4	42.5	36.7	25.0	0.7568	0.7083	0.6113	0.4172	80.0
POST DEVELOPMENT																		
055 A1	*Residential - 1/3 Acre*	*D*	*1373.0*	*1369.0*	*1518*	0.46	0.50	0.59	0.73	70.0	65.6	55.8	40.5	1.1668	1.0939	0.9298	0.6745	86.0
060 A2	*Business - Neighborhood*	*D*	*1370.0*	*1368.0*	*893*	0.68	0.69	0.73	0.80	37.2	36.3	32.8	26.6	0.6200	0.6052	0.5462	0.4428	95.0
063 A3	*Business - Neighborhood*	*D*	*1370.0*	*1368.0*	*895*	0.68	0.69	0.73	0.80	37.3	36.4	32.8	26.6	0.6211	0.6064	0.5472	0.4437	95.0
065 B1	*Residential - 1/4 Acre*	*D*	*1370.5*	*1369.5*	*868*	0.50	0.54	0.62	0.76	65.4	61.0	52.3	37.1	1.0898	1.0171	0.8718	0.6175	87.0
070 B2	*Schools*	*D*	*1372.5*	*1363.0*	*947*	0.49	0.51	0.56	0.66	33.8	32.6	29.9	24.3	0.5626	0.5441	0.4980	0.4058	92.8
075 C1	*Residential - 1/4 Acre*	*D*	*1372.0*	*1364.0*	*1342*	0.50	0.54	0.62	0.76	47.0	43.9	37.6	26.6	0.7835	0.7312	0.6268	0.4440	87.0
085 C2	*Residential - 1/4 Acre*	*D*	*1372.0*	*1364.0*	*1650*	0.50	0.54	0.62	0.76	55.8	52.1	44.7	31.6	0.9307	0.8686	0.7445	0.5274	87.0
090 D	*Residential - 1/4 Acre*	*D*	*1371.0*	*1364.0*	*1438*	0.50	0.54	0.62	0.76	52.1	48.6	41.6	29.5	0.8677	0.8098	0.6941	0.4917	87.0
110 E	*Schools*	*D*	*1372.0*	*1363.0*	*1024*	0.49	0.51	0.56	0.66	36.7	35.5	32.5	26.5	0.6113	0.5913	0.5412	0.4410	95.0

Project Name: Monarch Landing
Project Number: 0601010201-0300
Basin: 005

Total Area = 38.1 Acres
Total Area = 0.0595 sq. mi.
Composite Curve Number = 80.00

Land Use	Percent Impervious	Area/CN Hydrological Soil Group			
		A	B	C	D
Cultivated land without conservation treatment	0	72	81	88	91
Cultivated land with conservation treatement	0	62	71	78	81
Pasture or range land - poor condition	0	68	79	86	89
Pasture or range land - good condition	0	39	61	74	80
					38.1
Meadow - good condition	0	30	58	71	78
Wood or Forest land - thin stand, poor cover, no mulch	0	45	66	77	83
Wood or Forest land - good cover	0	25	55	70	77
Open spaces - good condition - grass cover on 75% or more of area	0	39	61	74	80
Open spaces - fair condition - grass cover on 50-75% of area	0	49	69	79	84
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential - 1/8 acre or less	65	77	85	90	92
Residential - 1/4 acre	38	61	75	83	87
Residentail - 1/3 acre	30	57	72	81	86
Residential - 1/2 acre	25	54	70	80	85
Residentail - 1 acre	20	51	68	79	84
Paved Parking lots, roofs, driveways, etc.	-	98	98	98	98
Streets and roads - paved with curbs and storm sewers	-	98	98	98	98
Streets and roads - gravel	-	76	85	89	91
Streets and roads - dirt	-	72	82	87	89
Lake/Pond	100	100	100	100	100

Project Name: Monarch Landing
Project Number: 0601010201-0300
Basin: 010

Total Area = 24.6 Acres
Total Area = 0.0384 sq. mi.
Composite Curve Number = 80.00

Land Use	Percent Impervious	Area/CN Hydrological Soil Group			
		A	B	C	D
Cultivated land without conservation treatment	0	72	81	88	91
Cultivated land with conservation treatement	0	62	71	78	81
Pasture or range land - poor condition	0	68	79	86	89
Pasture or range land - good condition	0	39	61	74	80
Meadow - good condition	0	30	58	71	78
Wood or Forest land - thin stand, poor cover, no mulch	0	45	66	77	83
Wood or Forest land - good cover	0	25	55	70	77
Open spaces - good condition - grass cover on 75% or more of area	0	39	61	74	80
Open spaces - fair condition - grass cover on 50-75% of area	0	49	69	79	84
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential - 1/8 acre or less	65	77	85	90	92
Residential - 1/4 acre	38	61	75	83	87
Residentail - 1/3 acre	30	57	72	81	86
Residential - 1/2 acre	25	54	70	80	85
Residentail - 1 acre	20	51	68	79	84
Paved Parking lots, roofs, driveways, etc.	-	98	98	98	98
Streets and roads - paved with curbs and storm sewers	-	98	98	98	98
Streets and roads - gravel	-	76	85	89	91
Streets and roads - dirt	-	72	82	87	89
Lake/Pond	100	100	100	100	100

Project Name: Monarch Landing
Project Number: 0601010201-0300
Basin: 035

Total Area = 36.9 Acres
Total Area = 0.0577 sq. mi.
Composite Curve Number = 80.00

Land Use	Percent Impervious	Area/CN Hydrological Soil Group			
		A	B	C	D
Cultivated land without conservation treatment	0	72	81	88	91
Cultivated land with conservation treatement	0	62	71	78	81
Pasture or range land - poor condition	0	68	79	86	89
Pasture or range land - good condition	0	39	61	74	80
Meadow - good condition	0	30	58	71	78
Wood or Forest land - thin stand, poor cover, no mulch	0	45	66	77	83
Wood or Forest land - good cover	0	25	55	70	77
Open spaces - good condition - grass cover on 75% or more of area	0	39	61	74	80
Open spaces - fair condition - grass cover on 50-75% of area	0	49	69	79	84
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential - 1/8 acre or less	65	77	85	90	92
Residential - 1/4 acre	38	61	75	83	87
Residentail - 1/3 acre	30	57	72	81	86
Residential - 1/2 acre	25	54	70	80	85
Residentail - 1 acre	20	51	68	79	84
Paved Parking lots, roofs, driveways, etc.	-	98	98	98	98
Streets and roads - paved with curbs and storm sewers	-	98	98	98	98
Streets and roads - gravel	-	76	85	89	91
Streets and roads - dirt	-	72	82	87	89
Lake/Pond	100	100	100	100	100

Project Name: Monarch Landing
Project Number: 0601010201-0300
Basin: 045

Total Area = 13.1 Acres
Total Area = 0.0204 sq. mi.
Composite Curve Number = 80.00

Land Use	Percent Impervious	Area/CN Hydrological Soil Group			
		A	B	C	D
Cultivated land without conservation treatment	0	72	81	88	91
Cultivated land with conservation treatement	0	62	71	78	81
Pasture or range land - poor condition	0	68	79	86	89
Pasture or range land - good condition	0	39	61	74	80 13.1
Meadow - good condition	0	30	58	71	78
Wood or Forest land - thin stand, poor cover, no mulch	0	45	66	77	83
Wood or Forest land - good cover	0	25	55	70	77
Open spaces - good condition - grass cover on 75% or more of area	0	39	61	74	80
Open spaces - fair condition - grass cover on 50-75% of area	0	49	69	79	84
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential - 1/8 acre or less	65	77	85	90	92
Residential - 1/4 acre	38	61	75	83	87
Residentail - 1/3 acre	30	57	72	81	86
Residential - 1/2 acre	25	54	70	80	85
Residentail - 1 acre	20	51	68	79	84
Paved Parking lots, roofs, driveways, etc.	-	98	98	98	98
Streets and roads - paved with curbs and storm sewers	-	98	98	98	98
Streets and roads - gravel	-	76	85	89	91
Streets and roads - dirt	-	72	82	87	89
Lake/Pond	100	100	100	100	100

Project Name: Monarch Landing
Project Number: 0601010201-0300
Basin: 050

Total Area = 9.8 Acres
Total Area = 0.0153 sq. mi.
Composite Curve Number = 80.00

Land Use	Percent Impervious	Area/CN Hydrological Soil Group			
		A	B	C	D
Cultivated land without conservation treatment	0	72	81	88	91
Cultivated land with conservation treatement	0	62	71	78	81
Pasture or range land - poor condition	0	68	79	86	89
Pasture or range land - good condition	0	39	61	74	80
					9.8
Meadow - good condition	0	30	58	71	78
Wood or Forest land - thin stand, poor cover, no mulch	0	45	66	77	83
Wood or Forest land - good cover	0	25	55	70	77
Open spaces - good condition - grass cover on 75% or more of area	0	39	61	74	80
Open spaces - fair condition - grass cover on 50-75% of area	0	49	69	79	84
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential - 1/8 acre or less	65	77	85	90	92
Residential - 1/4 acre	38	61	75	83	87
Residentail - 1/3 acre	30	57	72	81	86
Residential - 1/2 acre	25	54	70	80	85
Residentail - 1 acre	20	51	68	79	84
Paved Parking lots, roofs, driveways, etc.	-	98	98	98	98
Streets and roads - paved with curbs and storm sewers	-	98	98	98	98
Streets and roads - gravel	-	76	85	89	91
Streets and roads - dirt	-	72	82	87	89
Lake/Pond	100	100	100	100	100

Project Name: Monarch Landing
Project Number: 0601010201-0300
Basin: 050

Total Area = 25.6 Acres
Total Area = 0.0400 sq. mi.
Composite Curve Number = 86.00

Land Use	Percent Impervious	Area/CN Hydrological Soil Group			
		A	B	C	D
Cultivated land without conservation treatment	0	72	81	88	91
Cultivated land with conservation treatement	0	62	71	78	81
Pasture or range land - poor condition	0	68	79	86	89
Pasture or range land - good condition	0	39	61	74	80
Meadow - good condition	0	30	58	71	78
Wood or Forest land - thin stand, poor cover, no mulch	0	45	66	77	83
Wood or Forest land - good cover	0	25	55	70	77
Open spaces - good condition - grass cover on 75% or more of area	0	39	61	74	80
Open spaces - fair condition - grass cover on 50-75% of area	0	49	69	79	84
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential - 1/8 acre or less	65	77	85	90	92
Residential - 1/4 acre	38	61	75	83	87
Residentail - 1/3 acre	30	57	72	81	25.6 86
Residential - 1/2 acre	25	54	70	80	85
Residentail - 1 acre	20	51	68	79	84
Paved Parking lots, roofs, driveways, etc.	-	98	98	98	98
Streets and roads - paved with curbs and storm sewers	-	98	98	98	98
Streets and roads - gravel	-	76	85	89	91
Streets and roads - dirt	-	72	82	87	89
Lake/Pond	100	100	100	100	100

Project Name: Monarch Landing
Project Number: 0601010201-0300
Basin: 060

Total Area = 5.7 Acres
Total Area = 0.0089 sq. mi.
Composite Curve Number = 95.00

Land Use	Percent Impervious	Area/CN Hydrological Soil Group			
		A	B	C	D
Cultivated land without conservation treatment	0	72	81	88	91
Cultivated land with conservation treatement	0	62	71	78	81
Pasture or range land - poor condition	0	68	79	86	89
Pasture or range land - good condition	0	39	61	74	80
Meadow - good condition	0	30	58	71	78
Wood or Forest land - thin stand, poor cover, no mulch	0	45	66	77	83
Wood or Forest land - good cover	0	25	55	70	77
Open spaces - good condition - grass cover on 75% or more of area	0	39	61	74	80
Open spaces - fair condition - grass cover on 50-75% of area	0	49	69	79	84
Commercial and business	85	89	92	94	5.7 95
Industrial	72	81	88	91	93
Residential - 1/8 acre or less	65	77	85	90	92
Residential - 1/4 acre	38	61	75	83	87
Residentail - 1/3 acre	30	57	72	81	86
Residential - 1/2 acre	25	54	70	80	85
Residentail - 1 acre	20	51	68	79	84
Paved Parking lots, roofs, driveways, etc.	-	98	98	98	98
Streets and roads - paved with curbs and storm sewers	-	98	98	98	98
Streets and roads - gravel	-	76	85	89	91
Streets and roads - dirt	-	72	82	87	89
Lake/Pond	100	100	100	100	100

Project Name: Monarch Landing
Project Number: 0601010201-0300
Basin: 063

Total Area = 13.2 Acres
Total Area = 0.0206 sq. mi.
Composite Curve Number = 95.00

Land Use	Percent Impervious	Area/CN Hydrological Soil Group			
		A	B	C	D
Cultivated land without conservation treatment	0	72	81	88	91
Cultivated land with conservation treatement	0	62	71	78	81
Pasture or range land - poor condition	0	68	79	86	89
Pasture or range land - good condition	0	39	61	74	80
Meadow - good condition	0	30	58	71	78
Wood or Forest land - thin stand, poor cover, no mulch	0	45	66	77	83
Wood or Forest land - good cover	0	25	55	70	77
Open spaces - good condition - grass cover on 75% or more of area	0	39	61	74	80
Open spaces - fair condition - grass cover on 50-75% of area	0	49	69	79	84
Commercial and business	85	89	92	94	13.2 95
Industrial	72	81	88	91	93
Residential - 1/8 acre or less	65	77	85	90	92
Residential - 1/4 acre	38	61	75	83	87
Residentail - 1/3 acre	30	57	72	81	86
Residential - 1/2 acre	25	54	70	80	85
Residentail - 1 acre	20	51	68	79	84
Paved Parking lots, roofs, driveways, etc.	-	98	98	98	98
Streets and roads - paved with curbs and storm sewers	-	98	98	98	98
Streets and roads - gravel	-	76	85	89	91
Streets and roads - dirt	-	72	82	87	89
Lake/Pond	100	100	100	100	100

Project Name: Monarch Landing
Project Number: 0601010201-0300
Basin: 065

Total Area = 15.7 Acres
Total Area = 0.0245 sq. mi.
Composite Curve Number = 87.00

Land Use	Percent Impervious	Area/CN Hydrological Soil Group			
		A	B	C	D
Cultivated land without conservation treatment	0	72	81	88	91
Cultivated land with conservation treatement	0	62	71	78	81
Pasture or range land - poor condition	0	68	79	86	89
Pasture or range land - good condition	0	39	61	74	80
Meadow - good condition	0	30	58	71	78
Wood or Forest land - thin stand, poor cover, no mulch	0	45	66	77	83
Wood or Forest land - good cover	0	25	55	70	77
Open spaces - good condition - grass cover on 75% or more of area	0	39	61	74	80
Open spaces - fair condition - grass cover on 50-75% of area	0	49	69	79	84
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential - 1/8 acre or less	65	77	85	90	92
Residential - 1/4 acre	38	61	75	83	15.7 87
Residentail - 1/3 acre	30	57	72	81	86
Residential - 1/2 acre	25	54	70	80	85
Residentail - 1 acre	20	51	68	79	84
Paved Parking lots, roofs, driveways, etc.	-	98	98	98	98
Streets and roads - paved with curbs and storm sewers	-	98	98	98	98
Streets and roads - gravel	-	76	85	89	91
Streets and roads - dirt	-	72	82	87	89
Lake/Pond	100	100	100	100	100

Project Name: Monarch Landing
Project Number: 0601010201-0300
Basin: 070

Total Area = 13.0 Acres
Total Area = 0.0204 sq. mi.
Composite Curve Number = 92.83

Land Use	Percent Impervious	Area/CN Hydrological Soil Group			
		A	B	C	D
Cultivated land without conservation treatment	0	72	81	88	91
Cultivated land with conservation treatement	0	62	71	78	81
Pasture or range land - poor condition	0	68	79	86	89
Pasture or range land - good condition	0	39	61	74	80
Meadow - good condition	0	30	58	71	78
Wood or Forest land - thin stand, poor cover, no mulch	0	45	66	77	83
Wood or Forest land - good cover	0	25	55	70	77
Open spaces - good condition - grass cover on 75% or more of area	0	39	61	74	80
Open spaces - fair condition - grass cover on 50-75% of area	0	49	69	79	84
Commercial and business	85	89	92	94	9.5 95
Industrial	72	81	88	91	93
Residential - 1/8 acre or less	65	77	85	90	92
Residential - 1/4 acre	38	61	75	83	3.5 87
Residentail - 1/3 acre	30	57	72	81	86
Residential - 1/2 acre	25	54	70	80	85
Residentail - 1 acre	20	51	68	79	84
Paved Parking lots, roofs, driveways, etc.	-	98	98	98	98
Streets and roads - paved with curbs and storm sewers	-	98	98	98	98
Streets and roads - gravel	-	76	85	89	91
Streets and roads - dirt	-	72	82	87	89
Lake/Pond	100	100	100	100	100

Project Name: Monarch Landing
Project Number: 0601010201-0300
Basin: 075

Total Area = 28.9 Acres
Total Area = 0.0451 sq. mi.
Composite Curve Number = 87.00

Land Use	Percent Impervious	Area/CN Hydrological Soil Group			
		A	B	C	D
Cultivated land without conservation treatment	0	72	81	88	91
Cultivated land with conservation treatement	0	62	71	78	81
Pasture or range land - poor condition	0	68	79	86	89
Pasture or range land - good condition	0	39	61	74	80
Meadow - good condition	0	30	58	71	78
Wood or Forest land - thin stand, poor cover, no mulch	0	45	66	77	83
Wood or Forest land - good cover	0	25	55	70	77
Open spaces - good condition - grass cover on 75% or more of area	0	39	61	74	80
Open spaces - fair condition - grass cover on 50-75% of area	0	49	69	79	84
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential - 1/8 acre or less	65	77	85	90	92
Residential - 1/4 acre	38	61	75	83	28.9 87
Residentail - 1/3 acre	30	57	72	81	86
Residential - 1/2 acre	25	54	70	80	85
Residentail - 1 acre	20	51	68	79	84
Paved Parking lots, roofs, driveways, etc.	-	98	98	98	98
Streets and roads - paved with curbs and storm sewers	-	98	98	98	98
Streets and roads - gravel	-	76	85	89	91
Streets and roads - dirt	-	72	82	87	89
Lake/Pond	100	100	100	100	100

Project Name: Monarch Landing
Project Number: 0601010201-0300
Basin: 085

Total Area = 5.4 Acres
Total Area = 0.0085 sq. mi.
Composite Curve Number = 87.00

Land Use	Percent Impervious	Area/CN Hydrological Soil Group			
		A	B	C	D
Cultivated land without conservation treatment	0	72	81	88	91
Cultivated land with conservation treatement	0	62	71	78	81
Pasture or range land - poor condition	0	68	79	86	89
Pasture or range land - good condition	0	39	61	74	80
Meadow - good condition	0	30	58	71	78
Wood or Forest land - thin stand, poor cover, no mulch	0	45	66	77	83
Wood or Forest land - good cover	0	25	55	70	77
Open spaces - good condition - grass cover on 75% or more of area	0	39	61	74	80
Open spaces - fair condition - grass cover on 50-75% of area	0	49	69	79	84
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential - 1/8 acre or less	65	77	85	90	92
Residential - 1/4 acre	38	61	75	83	5.4 87
Residentail - 1/3 acre	30	57	72	81	86
Residential - 1/2 acre	25	54	70	80	85
Residentail - 1 acre	20	51	68	79	84
Paved Parking lots, roofs, driveways, etc.	-	98	98	98	98
Streets and roads - paved with curbs and storm sewers	-	98	98	98	98
Streets and roads - gravel	-	76	85	89	91
Streets and roads - dirt	-	72	82	87	89
Lake/Pond	100	100	100	100	100

050	Monarch Landing
Project Number:	0601010201-0300
Basin:	090

Total Area = 8.9 Acres
Total Area = 0.0139 sq. mi.
Composite Curve Number = 87.00

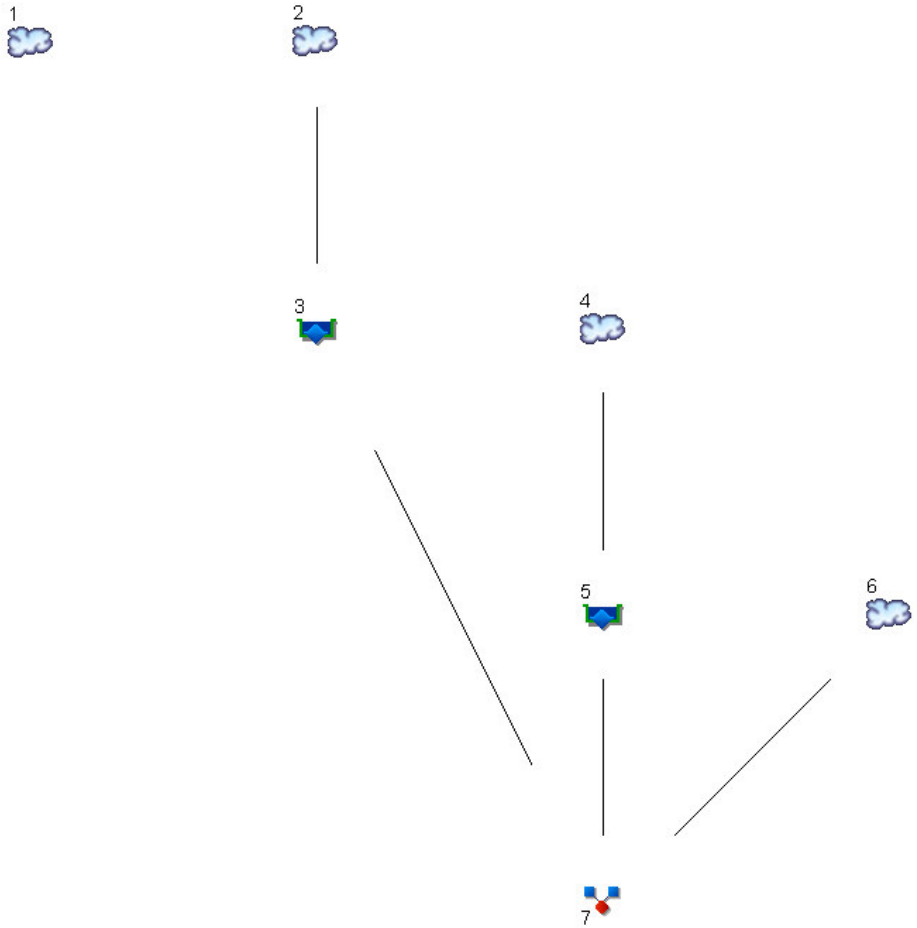
Land Use	Percent Impervious	Area/CN Hydrological Soil Group			
		A	B	C	D
Cultivated land without conservation treatment	0	72	81	88	91
Cultivated land with conservation treatement	0	62	71	78	81
Pasture or range land - poor condition	0	68	79	86	89
Pasture or range land - good condition	0	39	61	74	80
Meadow - good condition	0	30	58	71	78
Wood or Forest land - thin stand, poor cover, no mulch	0	45	66	77	83
Wood or Forest land - good cover	0	25	55	70	77
Open spaces - good condition - grass cover on 75% or more of area	0	39	61	74	80
Open spaces - fair condition - grass cover on 50-75% of area	0	49	69	79	84
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential - 1/8 acre or less	65	77	85	90	92
Residential - 1/4 acre	38	61	75	83	8.9 87
Residentail - 1/3 acre	30	57	72	81	86
Residential - 1/2 acre	25	54	70	80	85
Residentail - 1 acre	20	51	68	79	84
Paved Parking lots, roofs, driveways, etc.	-	98	98	98	98
Streets and roads - paved with curbs and storm sewers	-	98	98	98	98
Streets and roads - gravel	-	76	85	89	91
Streets and roads - dirt	-	72	82	87	89
Lake/Pond	100	100	100	100	100

Project Name: Monarch Landing
Project Number: 0601010201-0300
Basin: 110

Total Area = 5.5 Acres
Total Area = 0.0085 sq. mi.
Composite Curve Number = 95.00

Land Use	Percent Impervious	Area/CN Hydrological Soil Group			
		A	B	C	D
Cultivated land without conservation treatment	0	72	81	88	91
Cultivated land with conservation treatement	0	62	71	78	81
Pasture or range land - poor condition	0	68	79	86	89
Pasture or range land - good condition	0	39	61	74	80
Meadow - good condition	0	30	58	71	78
Wood or Forest land - thin stand, poor cover, no mulch	0	45	66	77	83
Wood or Forest land - good cover	0	25	55	70	77
Open spaces - good condition - grass cover on 75% or more of area	0	39	61	74	80
Open spaces - fair condition - grass cover on 50-75% of area	0	49	69	79	84
Commercial and business	85	89	92	94	5.5 95
Industrial	72	81	88	91	93
Residential - 1/8 acre or less	65	77	85	90	92
Residential - 1/4 acre	38	61	75	83	87
Residentail - 1/3 acre	30	57	72	81	86
Residential - 1/2 acre	25	54	70	80	85
Residentail - 1 acre	20	51	68	79	84
Paved Parking lots, roofs, driveways, etc.	-	98	98	98	98
Streets and roads - paved with curbs and storm sewers	-	98	98	98	98
Streets and roads - gravel	-	76	85	89	91
Streets and roads - dirt	-	72	82	87	89
Lake/Pond	100	100	100	100	100

Appendix F
Hydraflow Hydrographs Output



Legend

Hyd.	Origin	Description
1	SCS Runoff	Watershed A B4 10
2	SCS Runoff	Watershed A1 FTR 10
3	Reservoir	Watershed A1
4	SCS Runoff	Watershed A2 FTR 10
5	Reservoir	Detention Routing A2
6	SCS Runoff	Watershed A3 FTR 10
7	Combine	Combine All

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	-------	-------	34.02	-------	53.21	66.24	-------	-------	115.28	Watershed A B4 10
2	SCS Runoff	-------	-------	29.54	-------	43.19	52.31	-------	-------	85.66	Watershed A1 FTR 10
3	Reservoir	2	-------	14.45	-------	22.26	30.22	-------	-------	60.83	Watershed A1
4	SCS Runoff	-------	-------	12.02	-------	16.13	18.81	-------	-------	28.47	Watershed A2 FTR 10
5	Reservoir	4	-------	1.890	-------	5.559	7.969	-------	-------	16.00	Detention Routing A2
6	SCS Runoff	-------	-------	28.29	-------	37.97	44.27	-------	-------	67.00	Watershed A3 FTR 10
7	Combine	3, 5, 6	-------	33.40	-------	47.93	58.70	-------	-------	109.55	Combine All

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	34.02	6	750	224,063	----	------	------	Watershed A B4 10
2	SCS Runoff	29.54	6	750	191,916	----	------	------	Watershed A1 FTR 10
3	Reservoir	14.45	6	786	191,691	2	1367.67	73,748	Watershed A1
4	SCS Runoff	12.02	6	732	62,403	----	------	------	Watershed A2 FTR 10
5	Reservoir	1.890	6	780	62,270	4	1368.32	35,108	Detention Routing A2
6	SCS Runoff	28.29	6	732	146,882	----	------	------	Watershed A3 FTR 10
7	Combine	33.40	6	738	400,843	3, 5, 6	------	------	Combine All

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	53.21	6	750	346,247	----	------	------	Watershed A B4 10
2	SCS Runoff	43.19	6	744	281,266	----	------	------	Watershed A1 FTR 10
3	Reservoir	22.26	6	786	281,042	2	1368.30	105,059	Watershed A1
4	SCS Runoff	16.13	6	732	84,947	----	------	------	Watershed A2 FTR 10
5	Reservoir	5.559	6	768	84,815	4	1368.83	42,984	Detention Routing A2
6	SCS Runoff	37.97	6	732	199,946	----	------	------	Watershed A3 FTR 10
7	Combine	47.93	6	738	565,803	3, 5, 6	------	------	Combine All

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	66.24	6	750	430,295	----	------	------	Watershed A B4 10
2	SCS Runoff	52.31	6	744	341,370	----	------	------	Watershed A1 FTR 10
3	Reservoir	30.22	6	780	341,146	2	1368.62	122,065	Watershed A1
4	SCS Runoff	18.81	6	732	99,763	----	------	------	Watershed A2 FTR 10
5	Reservoir	7.969	6	762	99,630	4	1369.10	47,406	Detention Routing A2
6	SCS Runoff	44.27	6	732	234,818	----	------	------	Watershed A3 FTR 10
7	Combine	58.70	6	738	675,593	3, 5, 6	------	------	Combine All

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	115.28	6	744	751,860	----	------	------	Watershed A B4 10
2	SCS Runoff	85.66	6	744	566,126	----	------	------	Watershed A1 FTR 10
3	Reservoir	60.83	6	768	565,901	2	1369.40	165,581	Watershed A1
4	SCS Runoff	28.47	6	732	153,945	----	------	------	Watershed A2 FTR 10
5	Reservoir	16.00	6	756	153,813	4	1369.95	62,291	Detention Routing A2
6	SCS Runoff	67.00	6	732	362,351	----	------	------	Watershed A3 FTR 10
7	Combine	109.55	6	750	1,082,064	3, 5, 6	------	------	Combine All

Hydrograph Plot

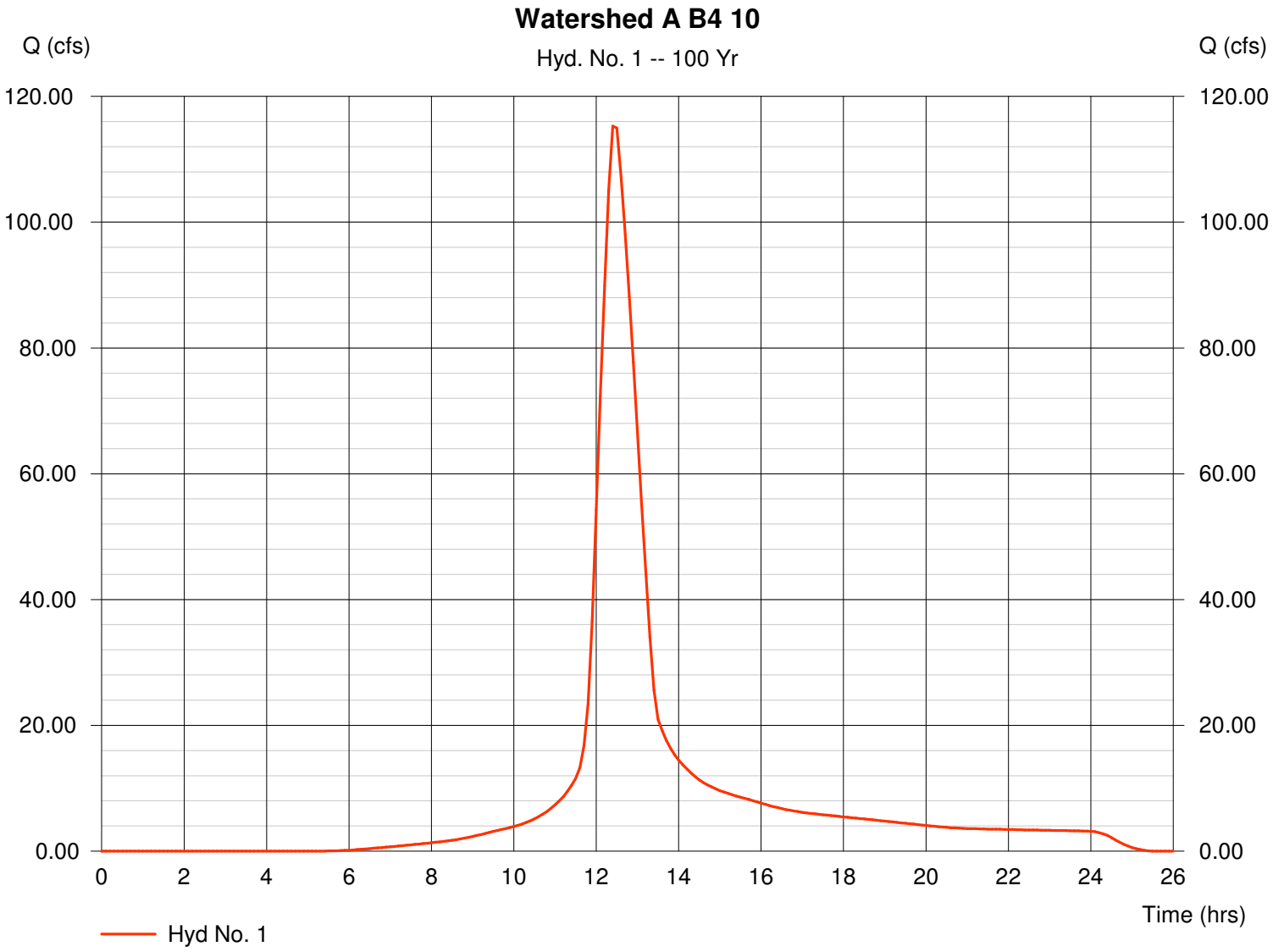
Hydraflow Hydrographs by Intelisolve | Friday, Sep 29 2006, 11:38 AM

Hyd. No. 1

Watershed A B4 10

Hydrograph type	= SCS Runoff	Peak discharge	= 115.28 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 38.090 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 54.60 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 751,860 cuft



Hydrograph Plot

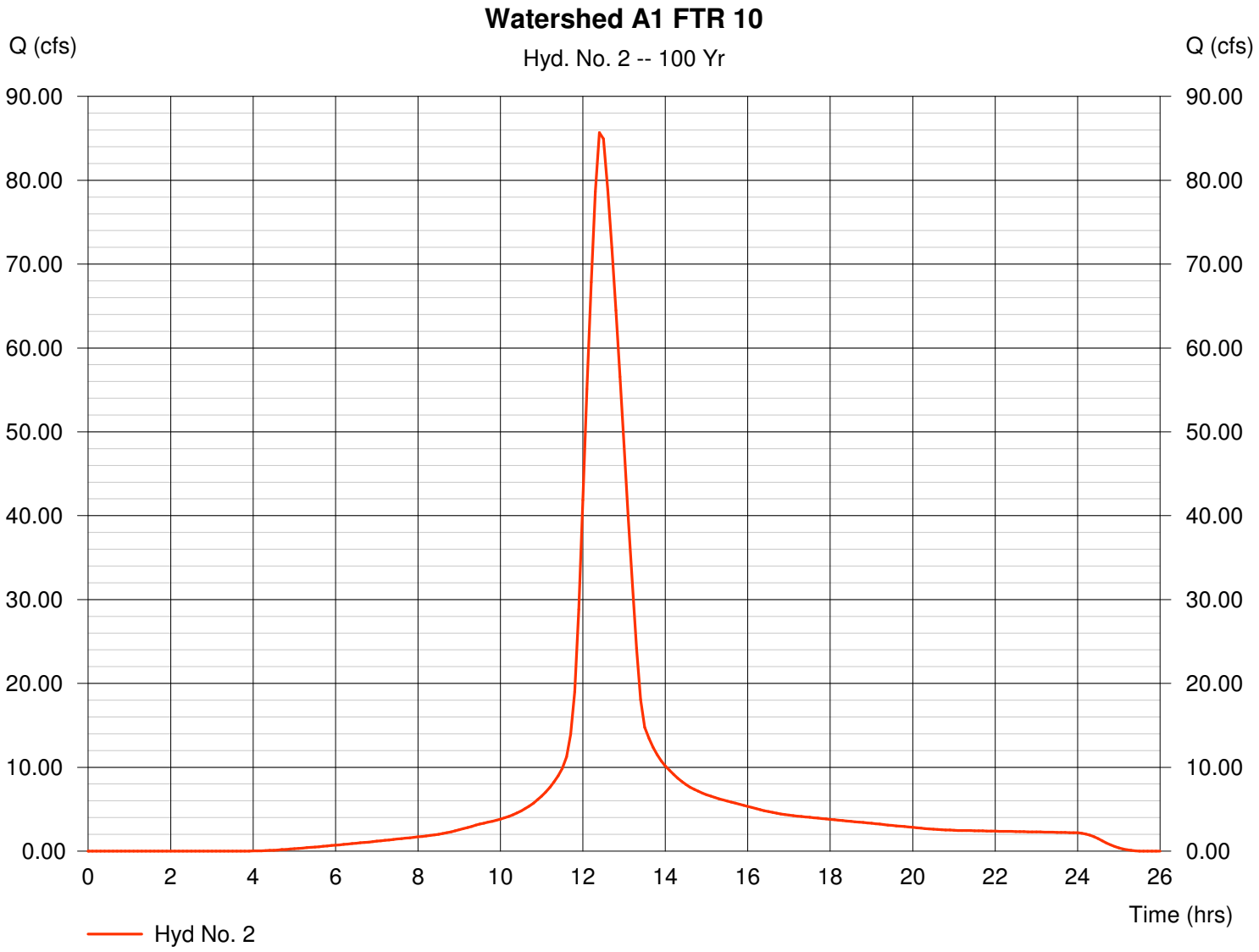
Hydraflow Hydrographs by Intelisolve | Friday, Sep 29 2006, 11:38 AM

Hyd. No. 2

Watershed A1 FTR 10

Hydrograph type	= SCS Runoff	Peak discharge	= 85.66 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 25.410 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 55.80 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 566,126 cuft



Hydrograph Plot

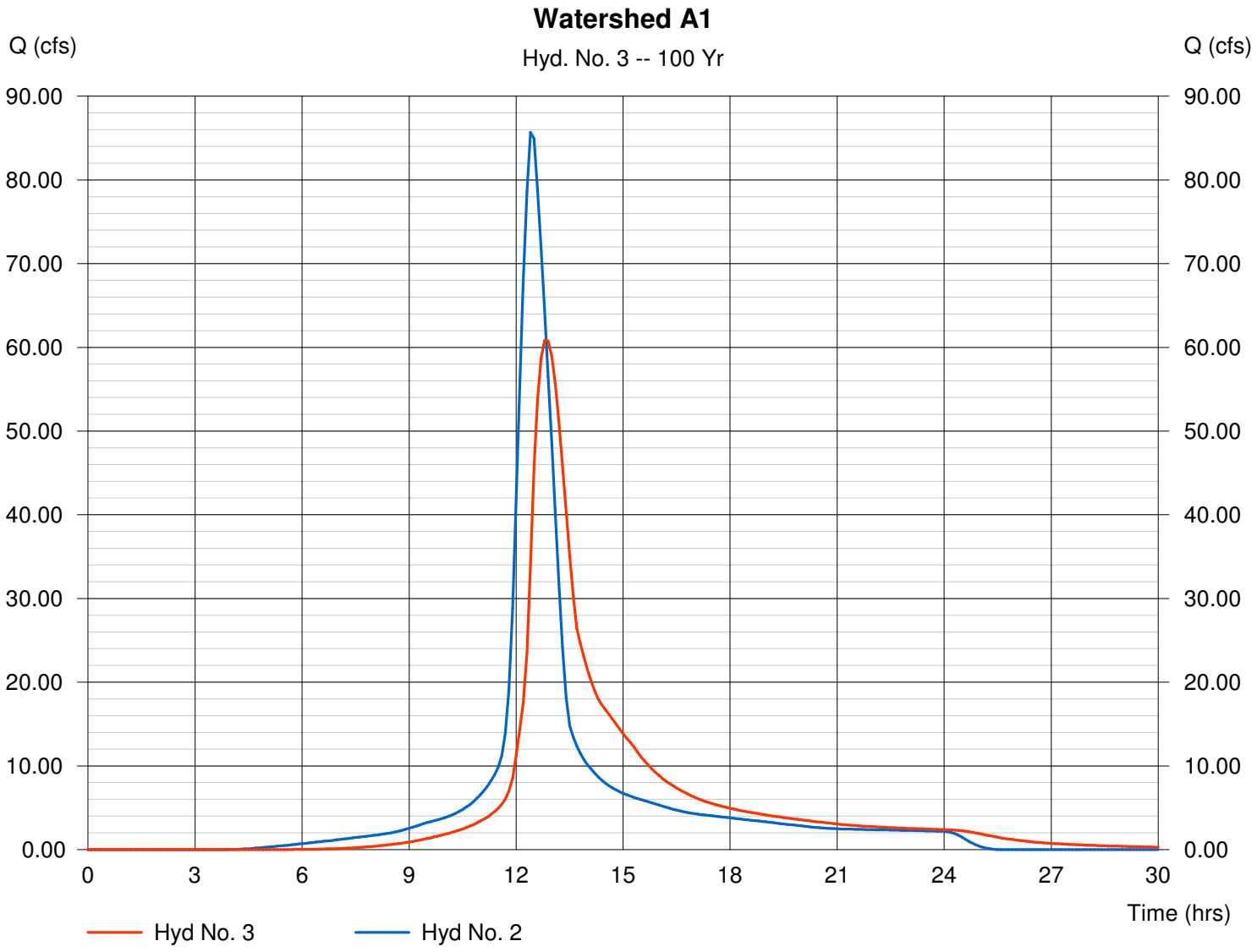
Hydraflow Hydrographs by Intelisolve | Friday, Sep 29 2006, 11:38 AM

Hyd. No. 3

Watershed A1

Hydrograph type	=	Reservoir	Peak discharge	=	60.83 cfs
Storm frequency	=	100 yrs	Time interval	=	6 min
Inflow hyd. No.	=	2	Max. Elevation	=	1369.40 ft
Reservoir name	=	Conceptual Watershed A1	Max. Storage	=	165,581 cuft

Storage Indication method used. | Hydrograph Volume = 565,901 cuft



Pond Report

Pond No. 1 - Conceptual Watershed A1

Pond Data

Bottom LxW = 200.0 x 200.0 ft Side slope = 6.0:1 Bottom elev. = 1366.00 ft Depth = 5.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1366.00	40,000	0	0
0.25	1366.25	41,209	10,151	10,151
0.50	1366.50	42,436	10,455	20,606
0.75	1366.75	43,681	10,764	31,370
1.00	1367.00	44,944	11,078	42,448
1.25	1367.25	46,225	11,396	53,844
1.50	1367.50	47,524	11,718	65,562
1.75	1367.75	48,841	12,045	77,607
2.00	1368.00	50,176	12,377	89,984
2.25	1368.25	51,529	12,713	102,697
2.50	1368.50	52,900	13,053	115,750
2.75	1368.75	54,289	13,398	129,148
3.00	1369.00	55,696	13,748	142,896
3.25	1369.25	57,121	14,102	156,998
3.50	1369.50	58,564	14,460	171,458
3.75	1369.75	60,025	14,823	186,281
4.00	1370.00	61,504	15,191	201,472
4.25	1370.25	63,001	15,563	217,035
4.50	1370.50	64,516	15,939	232,974
4.75	1370.75	66,049	16,320	249,294
5.00	1371.00	67,600	16,706	266,000

Culvert / Orifice Structures

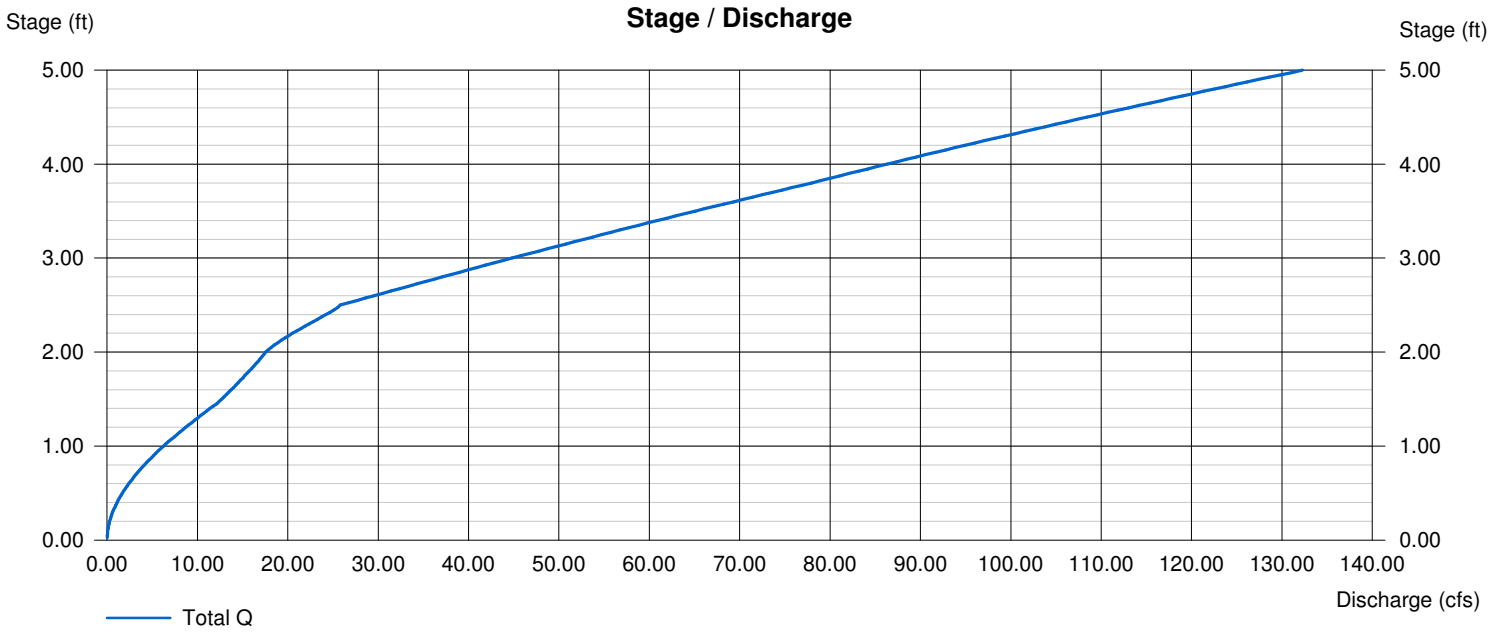
	[A]	[B]	[C]	[D]
Rise (in)	= 30.00	0.00	0.00	0.00
Span (in)	= 30.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1366.00	0.00	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	0.00
N-Value	= .013	.013	.000	.000
Orif. Coeff.	= 0.60	0.60	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 5.00	0.00	0.00	0.00
Crest El. (ft)	= 1368.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	0.00	0.00	0.00
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration = 0.000 in/hr (Wet area) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.



Hydrograph Plot

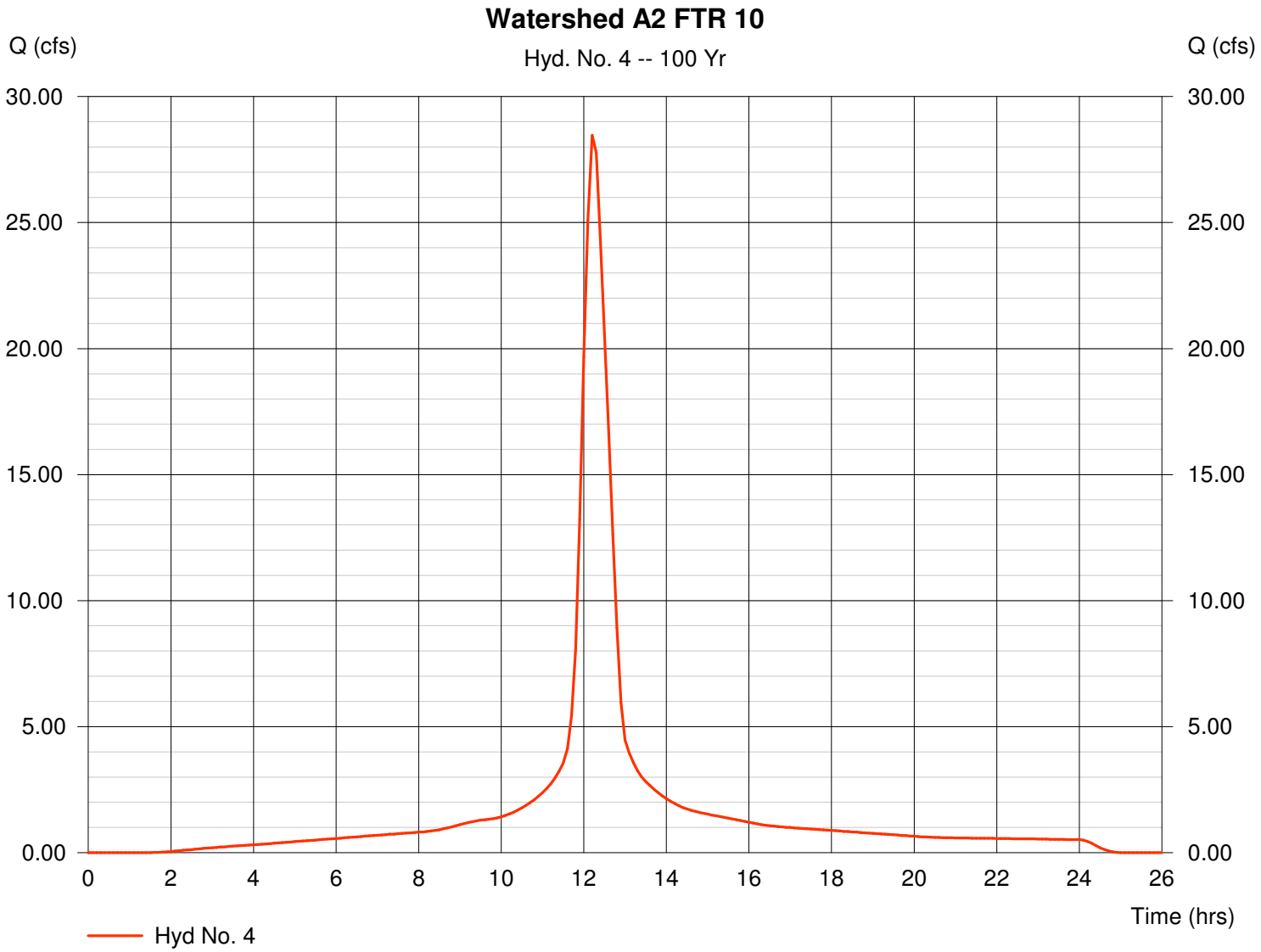
Hydraflow Hydrographs by Intelisolve | Friday, Sep 29 2006, 11:38 AM

Hyd. No. 4

Watershed A2 FTR 10

Hydrograph type	= SCS Runoff	Peak discharge	= 28.47 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 5.710 ac	Curve number	= 95
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 32.80 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 153,945 cuft



Hydrograph Plot

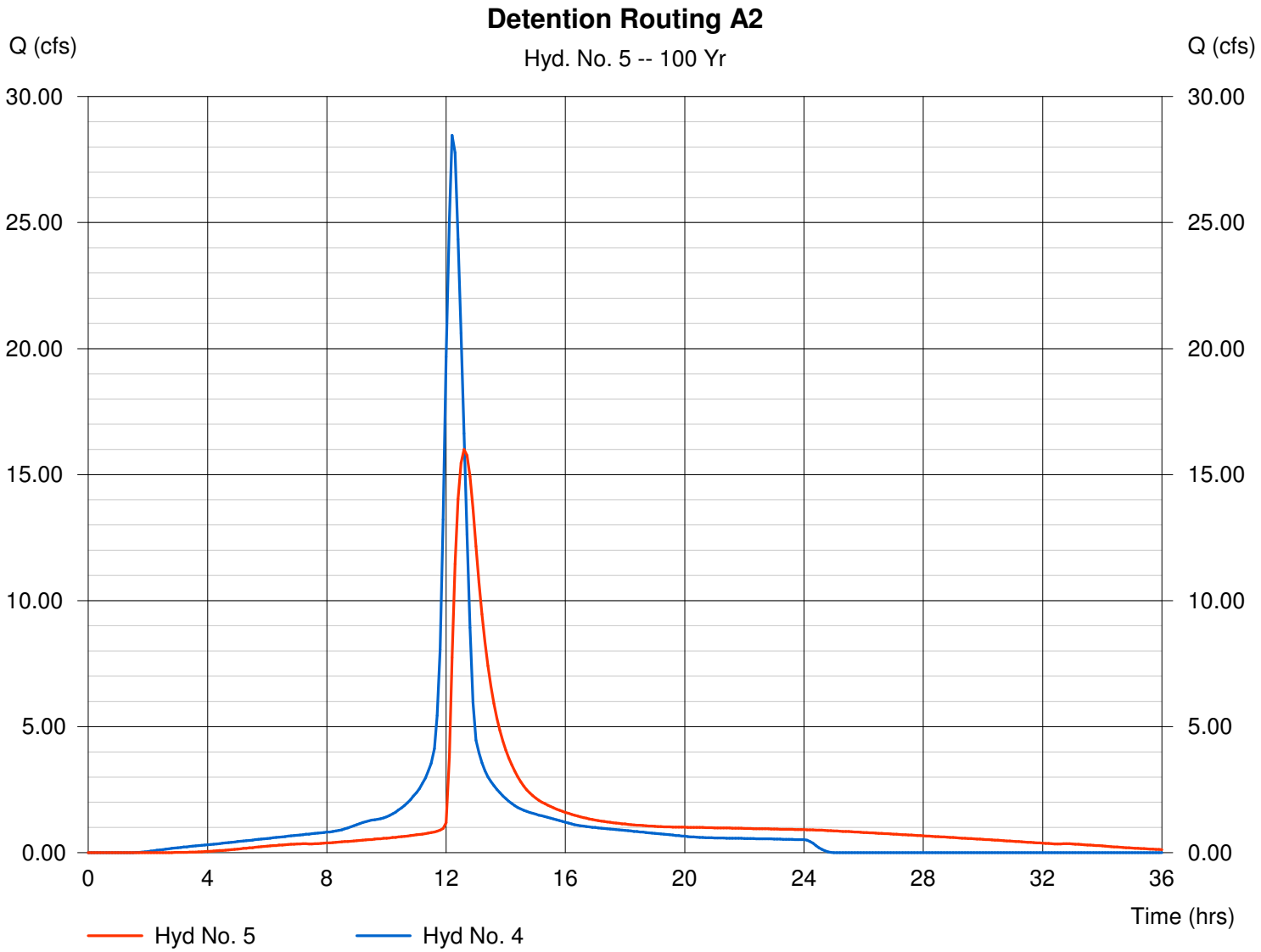
Hydraflow Hydrographs by Intelisolve | Friday, Sep 29 2006, 11:38 AM

Hyd. No. 5

Detention Routing A2

Hydrograph type	=	Reservoir	Peak discharge	=	16.00 cfs
Storm frequency	=	100 yrs	Time interval	=	6 min
Inflow hyd. No.	=	4	Max. Elevation	=	1369.95 ft
Reservoir name	=	Watershed A2	Max. Storage	=	62,291 cuft

Storage Indication method used. | Hydrograph Volume = 153,813 cuft



Pond Report

Pond No. 2 - Watershed A2

Pond Data

Bottom LxW = 100.0 x 100.0 ft Side slope = 4.0:1 Bottom elev. = 1365.50 ft Depth = 5.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1365.50	10,000	0	0
0.25	1365.75	10,404	2,550	2,550
0.50	1366.00	10,816	2,652	5,203
0.75	1366.25	11,236	2,756	7,959
1.00	1366.50	11,664	2,862	10,821
1.25	1366.75	12,100	2,970	13,792
1.50	1367.00	12,544	3,080	16,872
1.75	1367.25	12,996	3,192	20,064
2.00	1367.50	13,456	3,306	23,371
2.25	1367.75	13,924	3,422	26,793
2.50	1368.00	14,400	3,540	30,333
2.75	1368.25	14,884	3,660	33,994
3.00	1368.50	15,376	3,782	37,776
3.25	1368.75	15,876	3,906	41,682
3.50	1369.00	16,384	4,032	45,715
3.75	1369.25	16,900	4,160	49,875
4.00	1369.50	17,424	4,290	54,165
4.25	1369.75	17,956	4,422	58,588
4.50	1370.00	18,496	4,556	63,144
4.75	1370.25	19,044	4,692	67,836
5.00	1370.50	19,600	4,830	72,667

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise (in)	= 6.00	36.00	0.00	0.00
Span (in)	= 6.00	36.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 1365.50	1368.00	0.00	0.00
Length (ft)	= 50.00	50.00	0.00	0.00
Slope (%)	= 0.50	0.50	0.00	0.00
N-Value	= .013	.013	.000	.000
Orif. Coeff.	= 0.60	0.60	0.00	0.00
Multi-Stage	= n/a	No	No	No

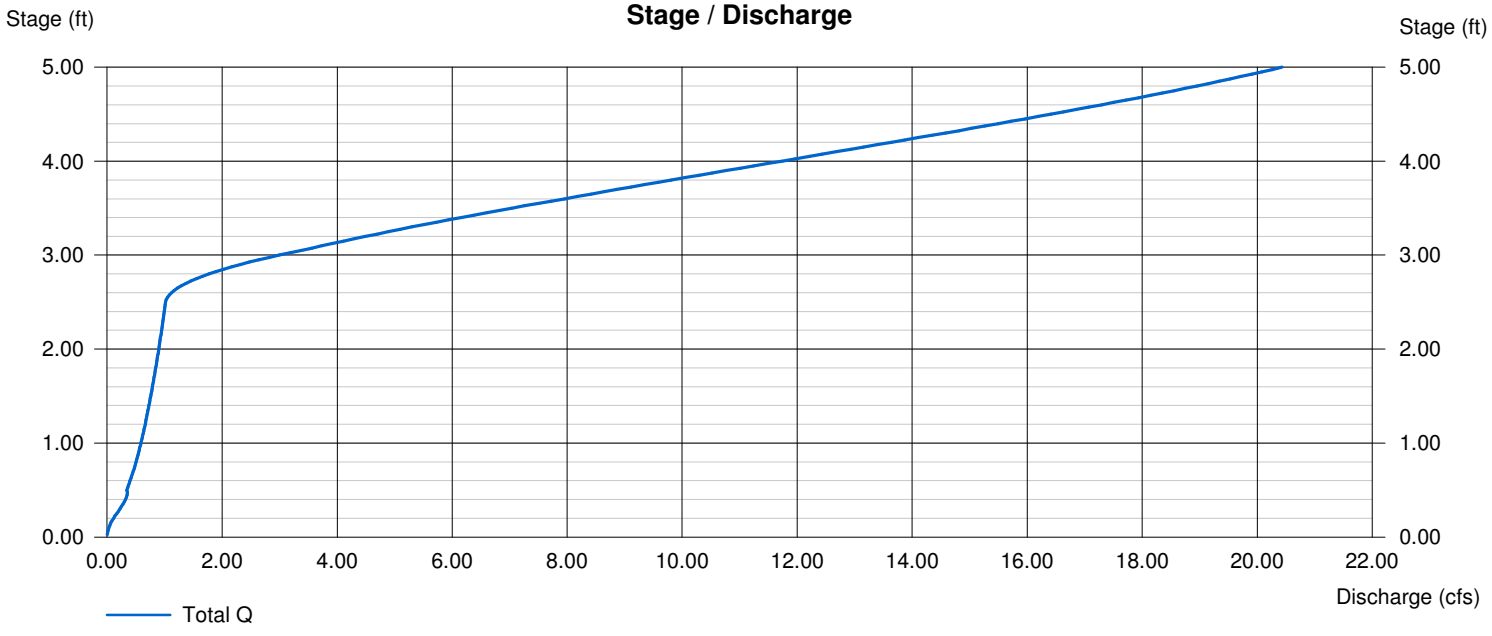
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	0.00	0.00
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration = 0.000 in/hr (Wet area) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.

Stage / Discharge



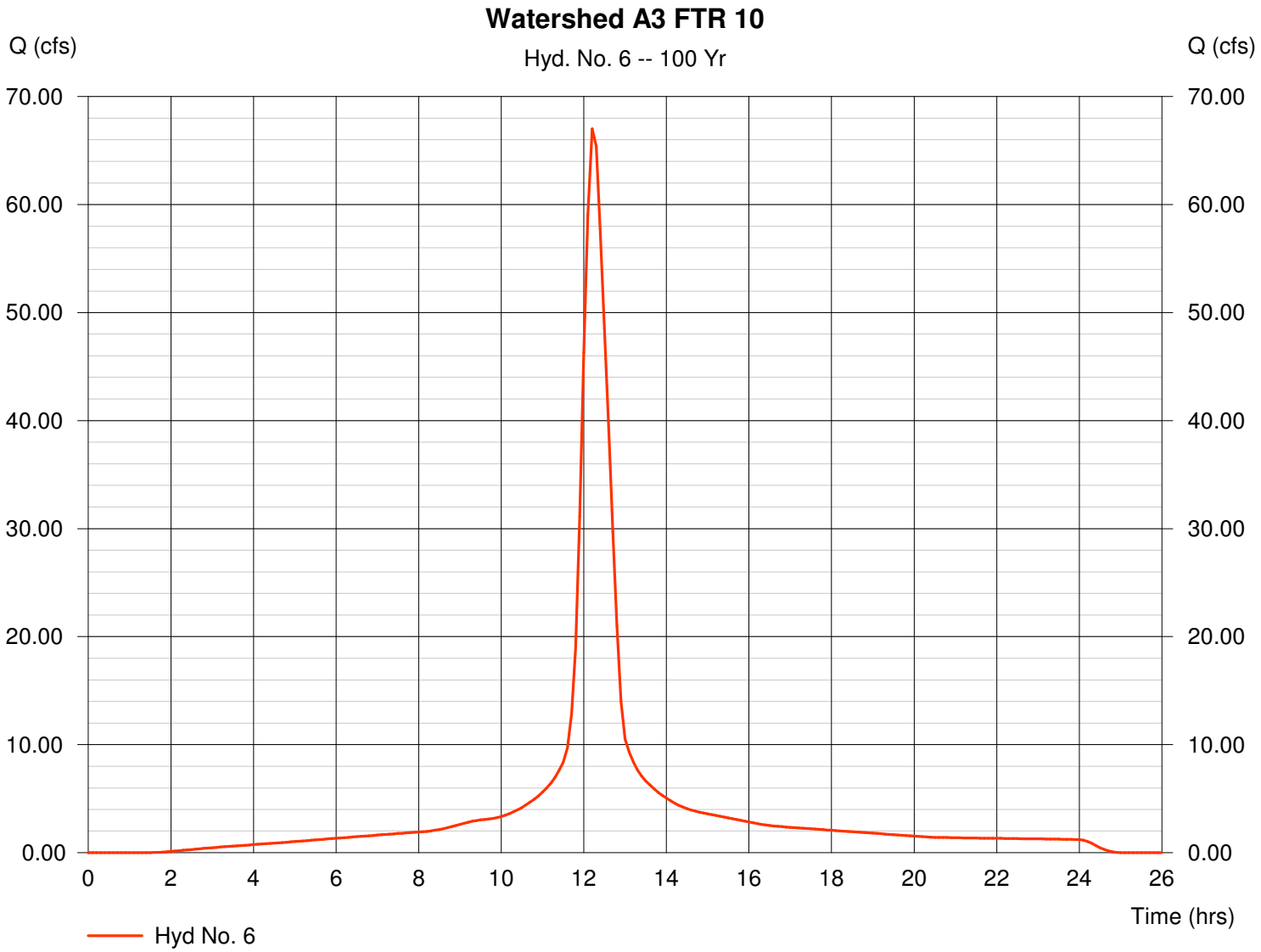
Hydrograph Plot

Hyd. No. 6

Watershed A3 FTR 10

Hydrograph type	= SCS Runoff	Peak discharge	= 67.00 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 13.440 ac	Curve number	= 95
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 32.80 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 362,351 cuft



Hydrograph Plot

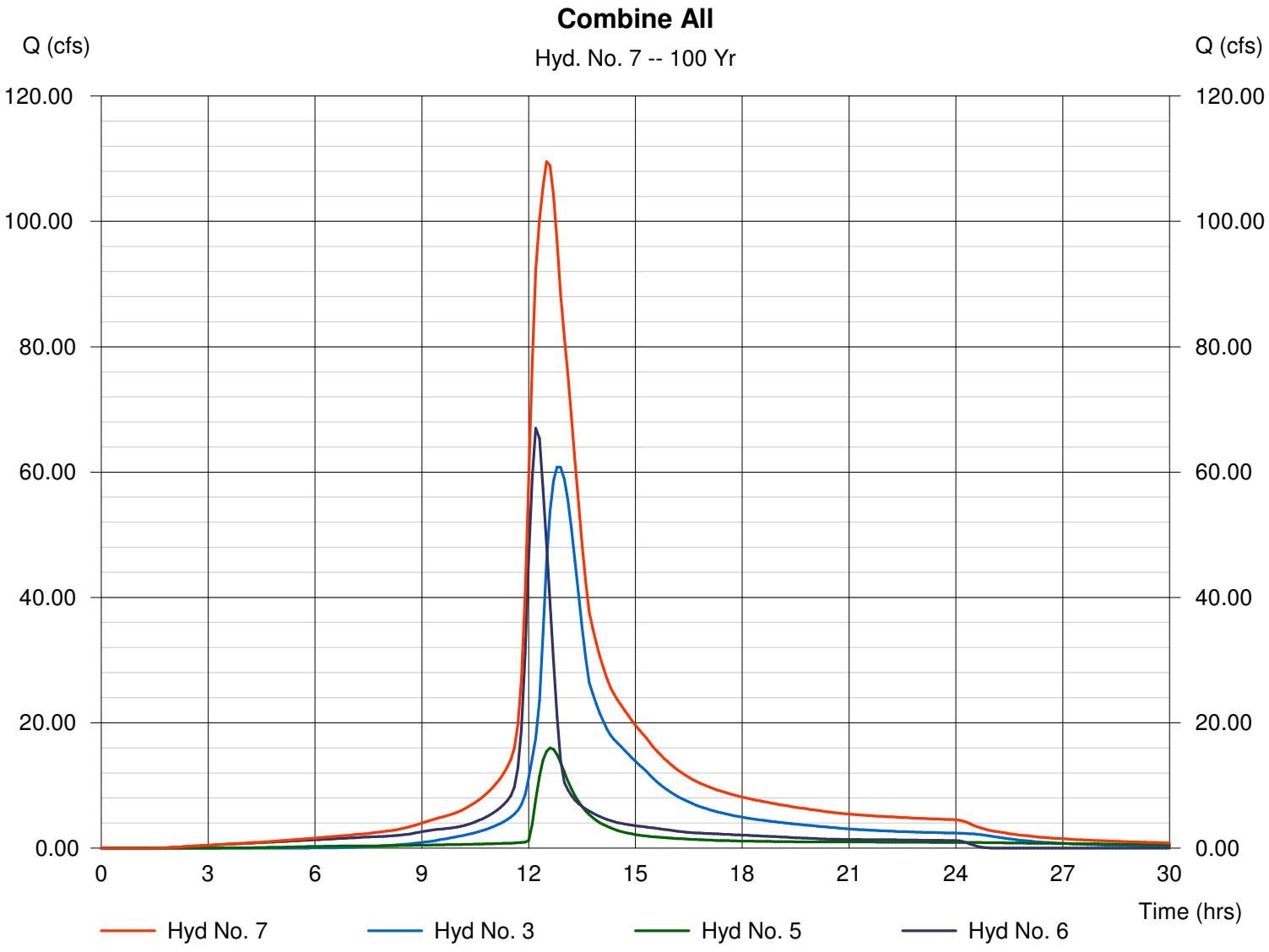
Hydraflow Hydrographs by Intelisolve | Friday, Sep 29 2006, 11:38 AM

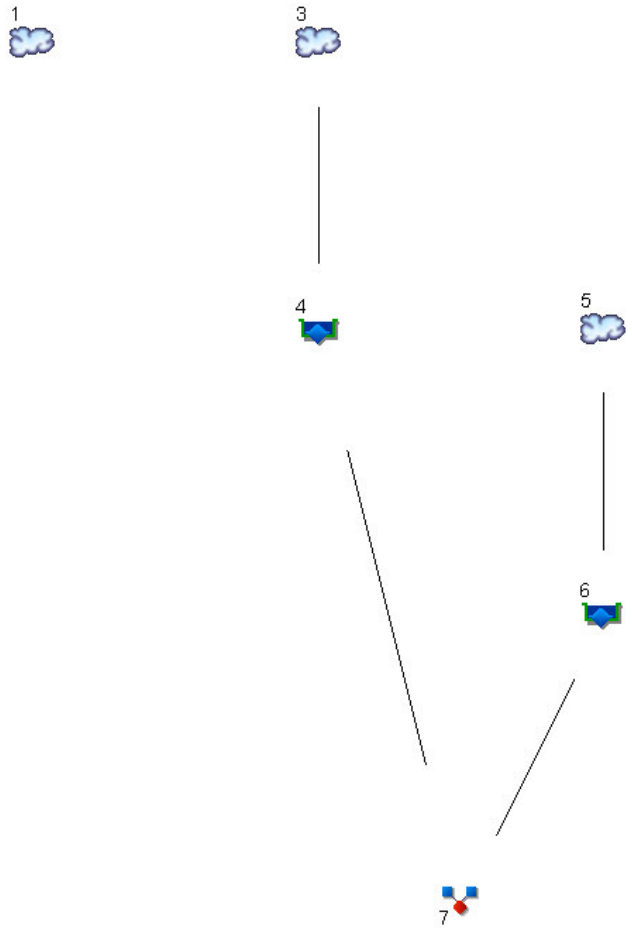
Hyd. No. 7

Combine All

Hydrograph type	=	Combine	Peak discharge	=	109.55 cfs
Storm frequency	=	100 yrs	Time interval	=	6 min
Inflow hyds.	=	3, 5, 6			

Hydrograph Volume = 1,082,064 cuft





Legend

Hyd.	Origin	Description
1	SCS Runoff	Watershed B West
3	SCS Runoff	Watershed B1 FTR Res
4	Reservoir	Watershed B1
5	SCS Runoff	Watershed B2 FTR WestSchool
6	Reservoir	School Detention
7	Combine	Total Discharge to West

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	-------	-------	24.48	-------	38.18	47.55	-------	-------	83.02	Watershed B West
3	SCS Runoff	-------	-------	18.93	-------	27.43	33.07	-------	-------	53.60	Watershed B1 FTR Res
4	Reservoir	3	-------	2.358	-------	5.924	8.360	-------	-------	15.49	Watershed B1
5	SCS Runoff	-------	-------	27.47	-------	36.87	42.98	-------	-------	65.06	Watershed B2 FTR WestSchool
6	Reservoir	5	-------	21.71	-------	35.33	42.69	-------	-------	64.53	School Detention
7	Combine	4, 6	-------	21.71	-------	35.34	43.11	-------	-------	69.94	Total Discharge to West

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	24.48	6	744	139,136	----	------	------	Watershed B West
3	SCS Runoff	18.93	6	750	123,040	----	------	------	Watershed B1 FTR Res
4	Reservoir	2.358	6	846	79,831	3	1367.76	77,945	Watershed B1
5	SCS Runoff	27.47	6	732	142,619	----	------	------	Watershed B2 FTR WestSchool
6	Reservoir	21.71	6	750	142,580	5	1367.09	26,388	School Detention
7	Combine	21.71	6	750	222,411	4, 6	------	------	Total Discharge to West

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	38.18	6	744	215,008	----	------	------	Watershed B West
3	SCS Runoff	27.43	6	744	178,809	----	------	------	Watershed B1 FTR Res
4	Reservoir	5.924	6	804	135,600	3	1368.30	105,306	Watershed B1
5	SCS Runoff	36.87	6	732	194,144	----	------	------	Watershed B2 FTR WestSchool
6	Reservoir	35.33	6	738	194,105	5	1367.34	29,376	School Detention
7	Combine	35.34	6	738	329,705	4, 6	------	------	Total Discharge to West

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	47.55	6	738	267,199	----	------	------	Watershed B West
3	SCS Runoff	33.07	6	744	216,202	----	------	------	Watershed B1 FTR Res
4	Reservoir	8.360	6	804	172,993	3	1368.65	123,677	Watershed B1
5	SCS Runoff	42.98	6	732	228,004	----	------	------	Watershed B2 FTR WestSchool
6	Reservoir	42.69	6	738	227,965	5	1367.45	30,628	School Detention
7	Combine	43.11	6	738	400,958	4, 6	------	------	Total Discharge to West

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	83.02	6	738	466,880	----	------	------	Watershed B West
3	SCS Runoff	53.60	6	744	355,577	----	------	------	Watershed B1 FTR Res
4	Reservoir	15.49	6	798	312,367	3	1369.92	196,608	Watershed B1
5	SCS Runoff	65.06	6	732	351,836	----	------	------	Watershed B2 FTR WestSchool
6	Reservoir	64.53	6	738	351,797	5	1367.71	33,873	School Detention
7	Combine	69.94	6	738	664,164	4, 6	------	------	Total Discharge to West

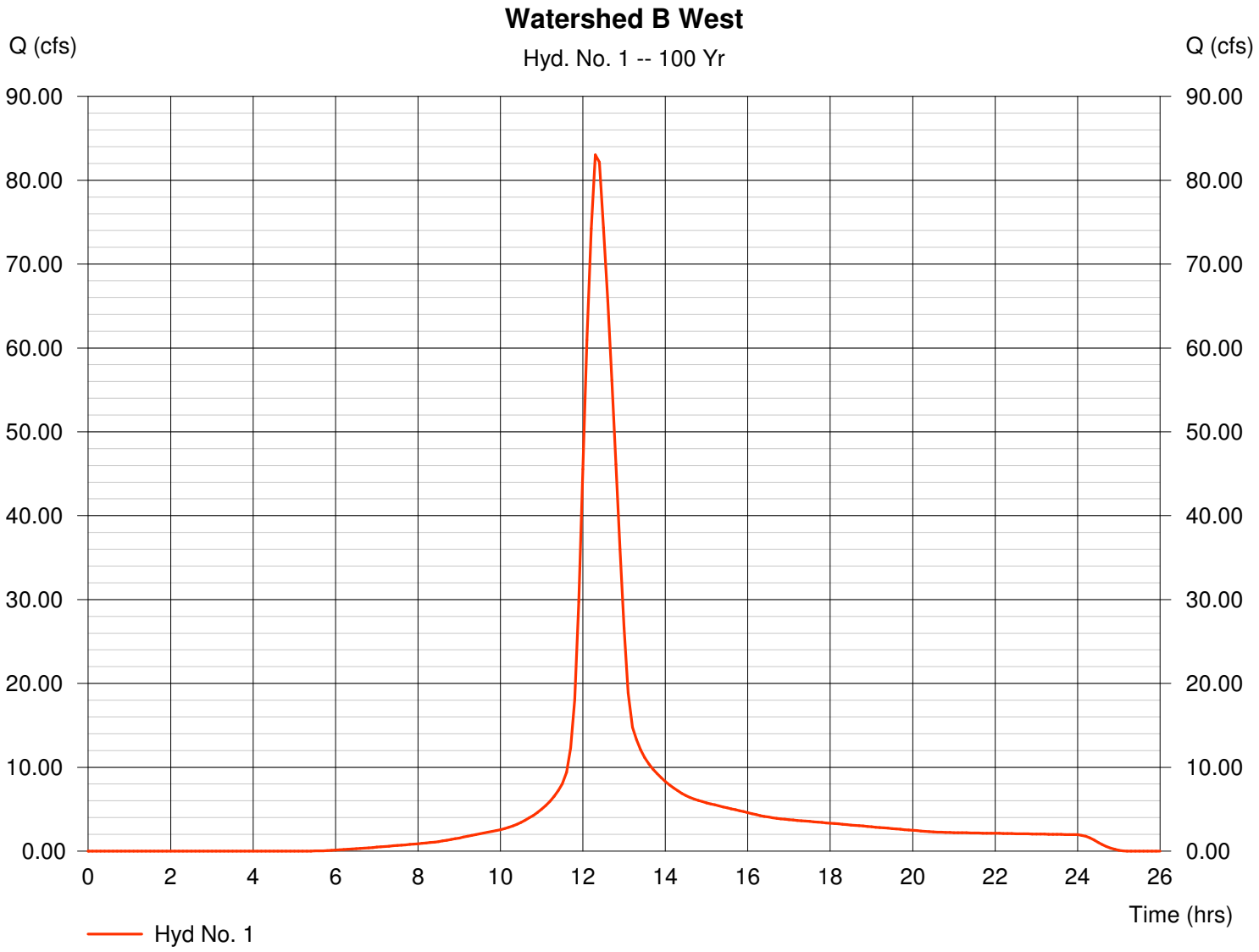
Hydrograph Plot

Hyd. No. 1

Watershed B West

Hydrograph type	= SCS Runoff	Peak discharge	= 83.02 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 24.259 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 47.70 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 466,880 cuft



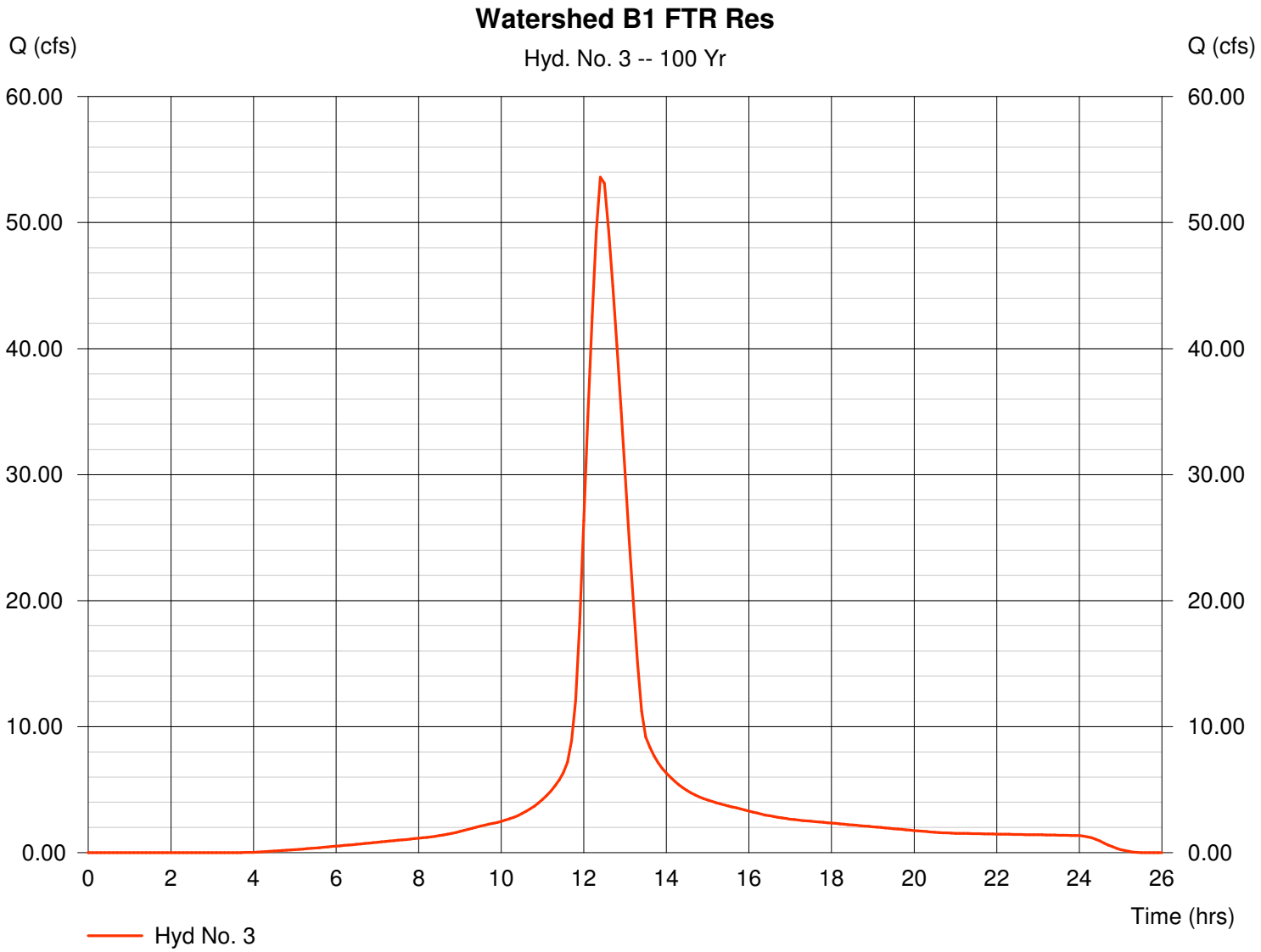
Hydrograph Plot

Hyd. No. 3

Watershed B1 FTR Res

Hydrograph type	= SCS Runoff	Peak discharge	= 53.60 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 15.660 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 52.30 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 355,577 cuft



Hydrograph Plot

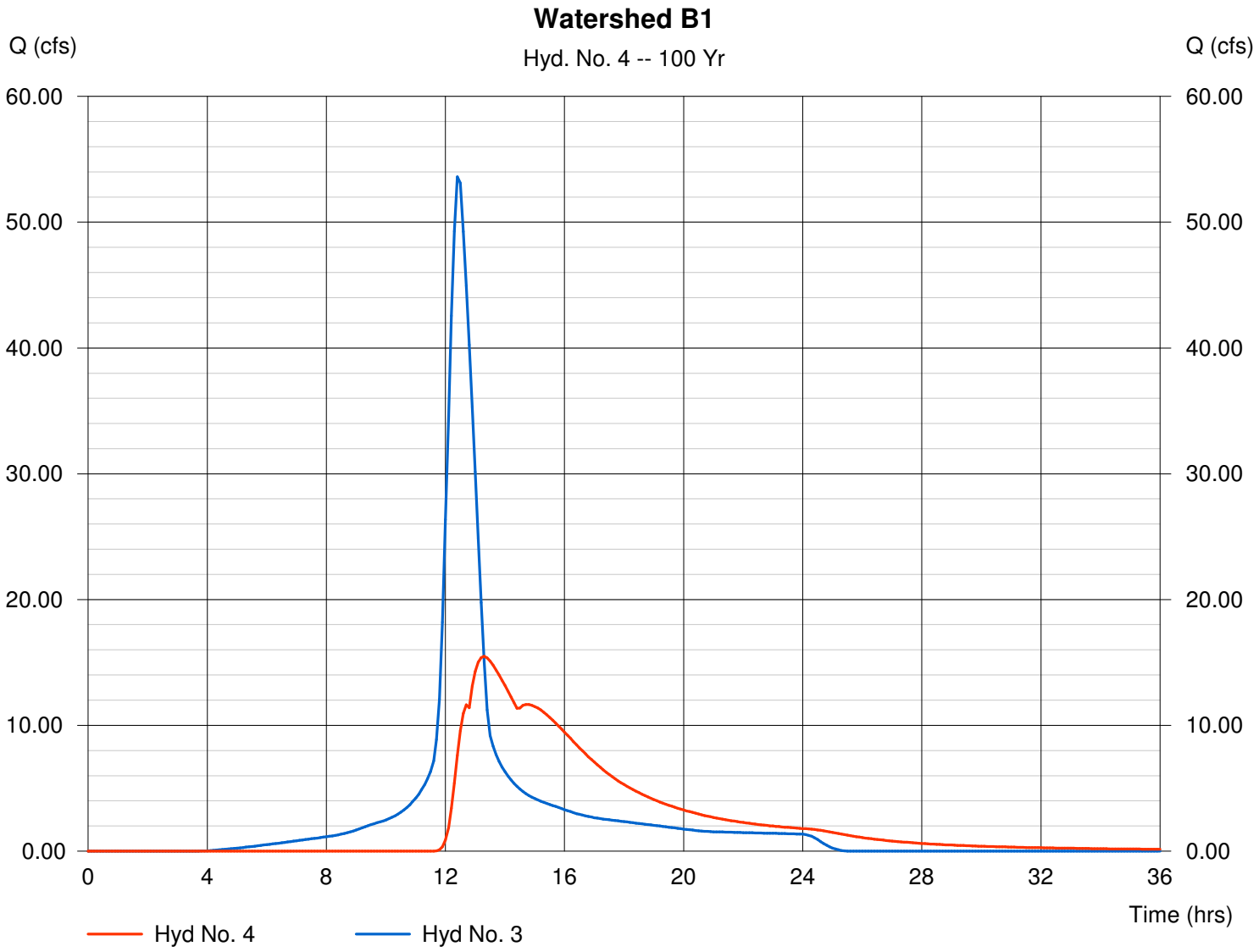
Hydraflow Hydrographs by Intelisolve | Friday, Sep 29 2006, 11:45 AM

Hyd. No. 4

Watershed B1

Hydrograph type	=	Reservoir	Peak discharge	=	15.49 cfs
Storm frequency	=	100 yrs	Time interval	=	6 min
Inflow hyd. No.	=	3	Max. Elevation	=	1369.92 ft
Reservoir name	=	Watershed B1 NorthWest	Max. Storage	=	196,608 cuft

Storage Indication method used. | Hydrograph Volume = 312,367 cuft



Pond Report

Pond No. 1 - Watershed B1 NorthWest

Pond Data

Bottom LxW = 200.0 x 200.0 ft Side slope = 6.0:1 Bottom elev. = 1366.00 ft Depth = 7.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1366.00	40,000	0	0
0.35	1366.35	41,698	14,296	14,296
0.70	1366.70	43,431	14,896	29,192
1.05	1367.05	45,199	15,509	44,702
1.40	1367.40	47,002	16,134	60,836
1.75	1367.75	48,841	16,772	77,607
2.10	1368.10	50,715	17,421	95,029
2.45	1368.45	52,624	18,083	113,112
2.80	1368.80	54,569	18,758	131,870
3.15	1369.15	56,549	19,445	151,314
3.50	1369.50	58,564	20,144	171,458
3.85	1369.85	60,614	20,855	192,313
4.20	1370.20	62,700	21,579	213,892
4.55	1370.55	64,821	22,315	236,207
4.90	1370.90	66,977	23,064	259,271
5.25	1371.25	69,169	23,825	283,096
5.60	1371.60	71,396	24,598	307,693
5.95	1371.95	73,658	25,383	333,077
6.30	1372.30	75,955	26,181	359,258
6.65	1372.65	78,288	26,992	386,250
7.00	1373.00	80,656	27,814	414,064

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise (in)	= 30.00	0.00	0.00	0.00
Span (in)	= 30.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1365.00	0.00	0.00	0.00
Length (ft)	= 450.00	0.00	0.00	0.00
Slope (%)	= 0.10	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

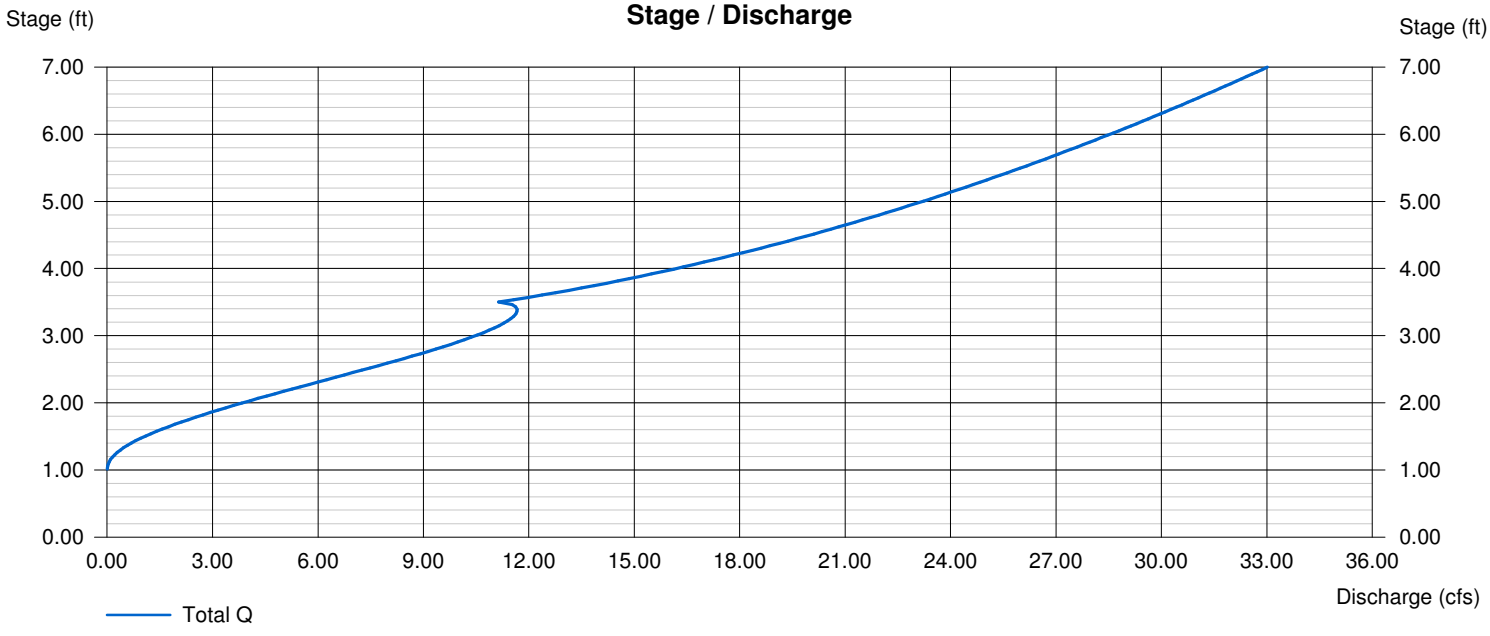
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 0.00	0.00	0.00	0.00
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration = 0.000 in/hr (Wet area) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.

Stage / Discharge



Hydrograph Plot

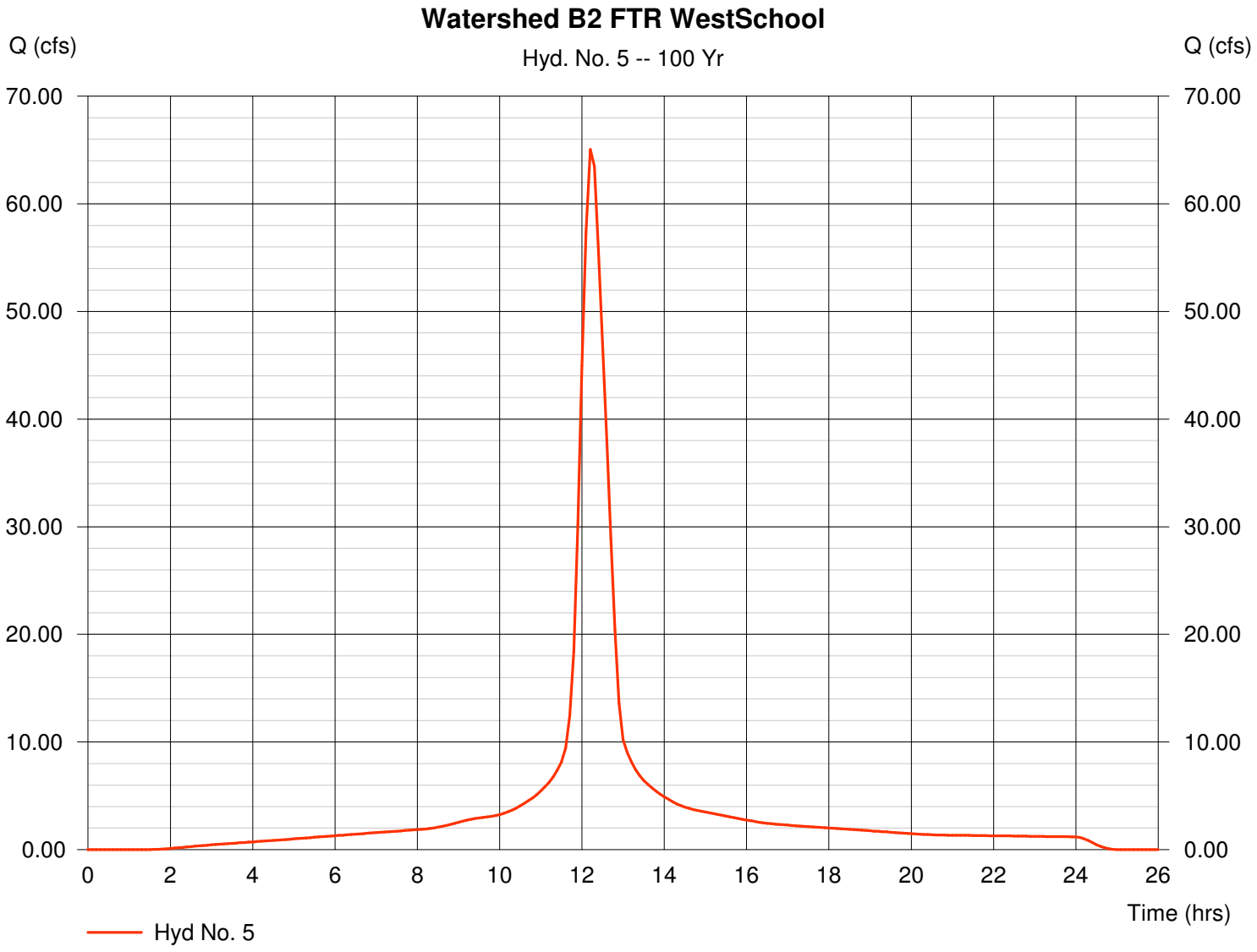
Hydraflow Hydrographs by Intelisolve | Friday, Sep 29 2006, 11:45 AM

Hyd. No. 5

Watershed B2 FTR WestSchool

Hydrograph type	= SCS Runoff	Peak discharge	= 65.06 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 13.050 ac	Curve number	= 95
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 29.90 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 351,836 cuft



Hydrograph Plot

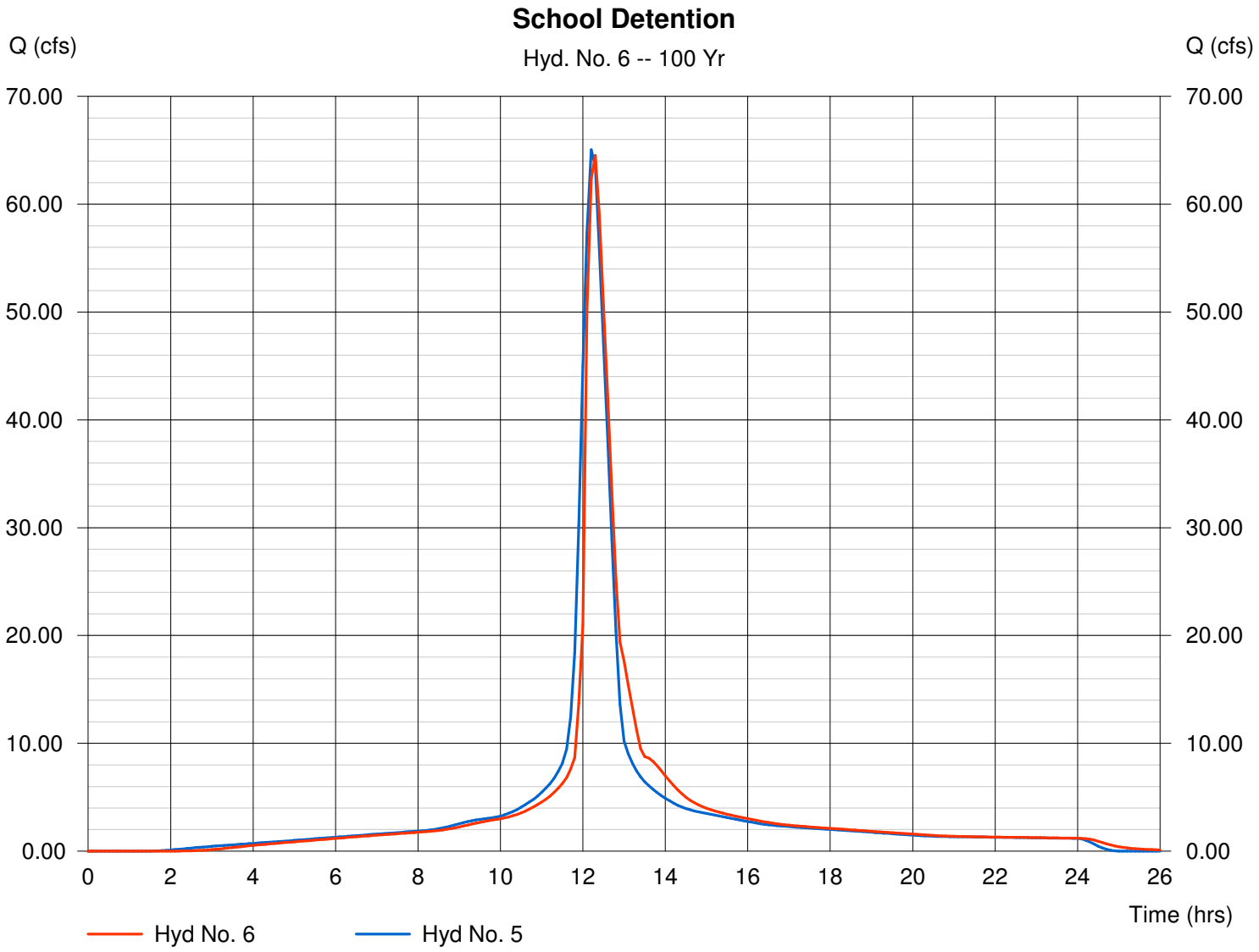
Hydraflow Hydrographs by Intelisolve | Friday, Sep 29 2006, 11:45 AM

Hyd. No. 6

School Detention

Hydrograph type	=	Reservoir	Peak discharge	=	64.53 cfs
Storm frequency	=	100 yrs	Time interval	=	6 min
Inflow hyd. No.	=	5	Max. Elevation	=	1367.71 ft
Reservoir name	=	School Detention	Max. Storage	=	33,873 cuft

Storage Indication method used. | Hydrograph Volume = 351,797 cuft



Pond Report

Pond No. 2 - School Detention

Pond Data

Bottom LxW = 40.0 x 150.0 ft Side slope = 4.0:1 Bottom elev. = 1364.00 ft Depth = 5.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1364.00	6,000	0	0
0.25	1364.25	6,384	1,548	1,548
0.50	1364.50	6,776	1,645	3,193
0.75	1364.75	7,176	1,744	4,937
1.00	1365.00	7,584	1,845	6,781
1.25	1365.25	8,000	1,948	8,729
1.50	1365.50	8,424	2,053	10,782
1.75	1365.75	8,856	2,160	12,942
2.00	1366.00	9,296	2,269	15,211
2.25	1366.25	9,744	2,380	17,590
2.50	1366.50	10,200	2,493	20,083
2.75	1366.75	10,664	2,608	22,691
3.00	1367.00	11,136	2,725	25,416
3.25	1367.25	11,616	2,844	28,260
3.50	1367.50	12,104	2,965	31,225
3.75	1367.75	12,600	3,088	34,312
4.00	1368.00	13,104	3,213	37,525
4.25	1368.25	13,616	3,340	40,865
4.50	1368.50	14,136	3,469	44,334
4.75	1368.75	14,664	3,600	47,934
5.00	1369.00	15,200	3,733	51,667

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise (in)	= 24.00	0.00	0.00	0.00
Span (in)	= 24.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1364.00	0.00	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

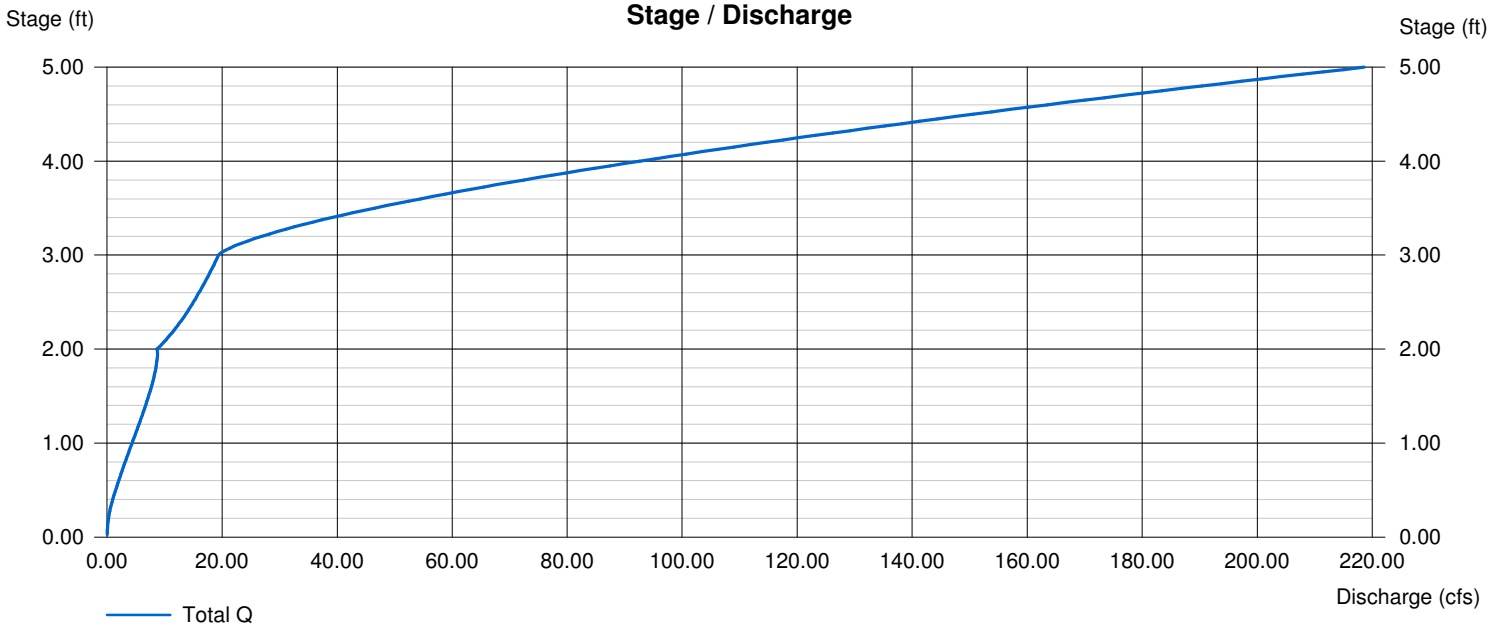
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 20.00	0.00	0.00	0.00
Crest El. (ft)	= 1367.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	0.00	0.00
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration = 0.000 in/hr (Wet area) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.

Stage / Discharge



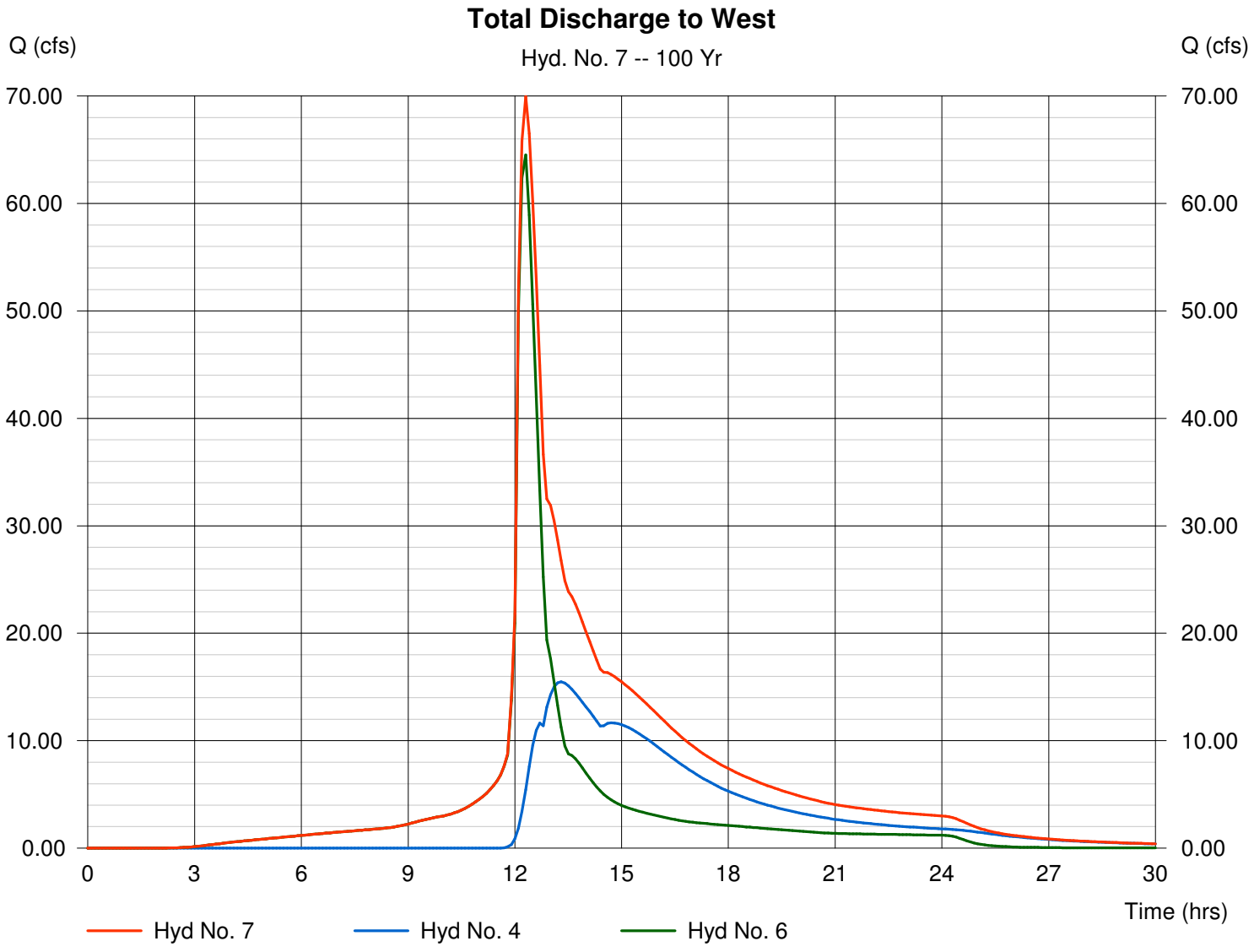
Hydrograph Plot

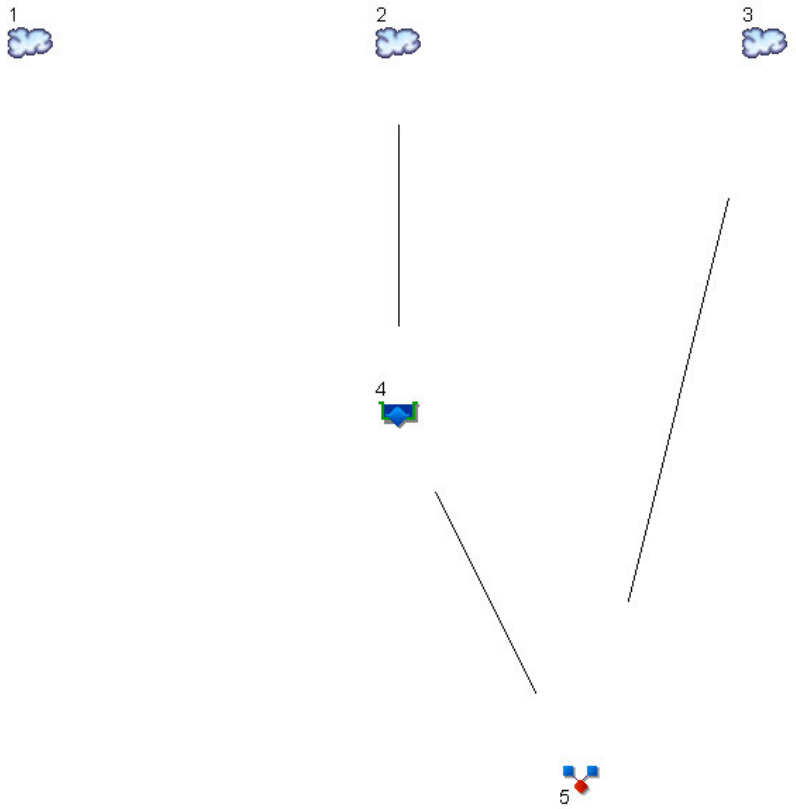
Hyd. No. 7

Total Discharge to West

Hydrograph type	= Combine	Peak discharge	= 69.94 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Inflow hyds.	= 4, 6		

Hydrograph Volume = 664,164 cuft





Legend

Hyd.	Origin	Description
1	SCS Runoff	Watershed C B4 10
2	SCS Runoff	Watershed C1 FTR 10
3	SCS Runoff	Watershed C2 FTR 10
4	Reservoir	<no description>
5	Combine	<no description>

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	-------	-------	37.24	-------	58.09	72.34	-------	-------	126.32	Watershed C B4 10
2	SCS Runoff	-------	-------	37.21	-------	53.99	65.05	-------	-------	105.33	Watershed C1 FTR 10
3	SCS Runoff	-------	-------	13.82	-------	20.04	24.15	-------	-------	39.11	Watershed C2 FTR 10
4	Reservoir	2	-------	21.51	-------	33.03	40.69	-------	-------	82.04	<no description>
5	Combine	3, 4	-------	33.13	-------	50.14	61.46	-------	-------	118.37	<no description>

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	37.24	6	744	211,693	----	------	------	Watershed C B4 10
2	SCS Runoff	37.21	6	732	187,006	----	------	------	Watershed C1 FTR 10
3	SCS Runoff	13.82	6	738	77,525	----	------	------	Watershed C2 FTR 10
4	Reservoir	21.51	6	756	186,987	2	1366.01	57,921	<no description>
5	Combine	33.13	6	750	264,512	3, 4	------	------	<no description>

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	58.09	6	744	327,132	----	------	------	Watershed C B4 10
2	SCS Runoff	53.99	6	732	271,768	----	------	------	Watershed C1 FTR 10
3	SCS Runoff	20.04	6	738	112,664	----	------	------	Watershed C2 FTR 10
4	Reservoir	33.03	6	756	271,749	2	1366.50	79,507	<no description>
5	Combine	50.14	6	750	384,412	3, 4	------	------	<no description>

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	72.34	6	738	406,541	----	------	------	Watershed C B4 10
2	SCS Runoff	65.05	6	732	328,601	----	------	------	Watershed C1 FTR 10
3	SCS Runoff	24.15	6	738	136,224	----	------	------	Watershed C2 FTR 10
4	Reservoir	40.69	6	756	328,582	2	1366.80	93,068	<no description>
5	Combine	61.46	6	750	464,805	3, 4	------	------	<no description>

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	126.32	6	738	710,353	----	------	------	Watershed C B4 10
2	SCS Runoff	105.33	6	732	540,432	----	------	------	Watershed C1 FTR 10
3	SCS Runoff	39.11	6	738	224,041	----	------	------	Watershed C2 FTR 10
4	Reservoir	82.04	6	750	540,413	2	1367.53	128,061	<no description>
5	Combine	118.37	6	744	764,454	3, 4	------	------	<no description>

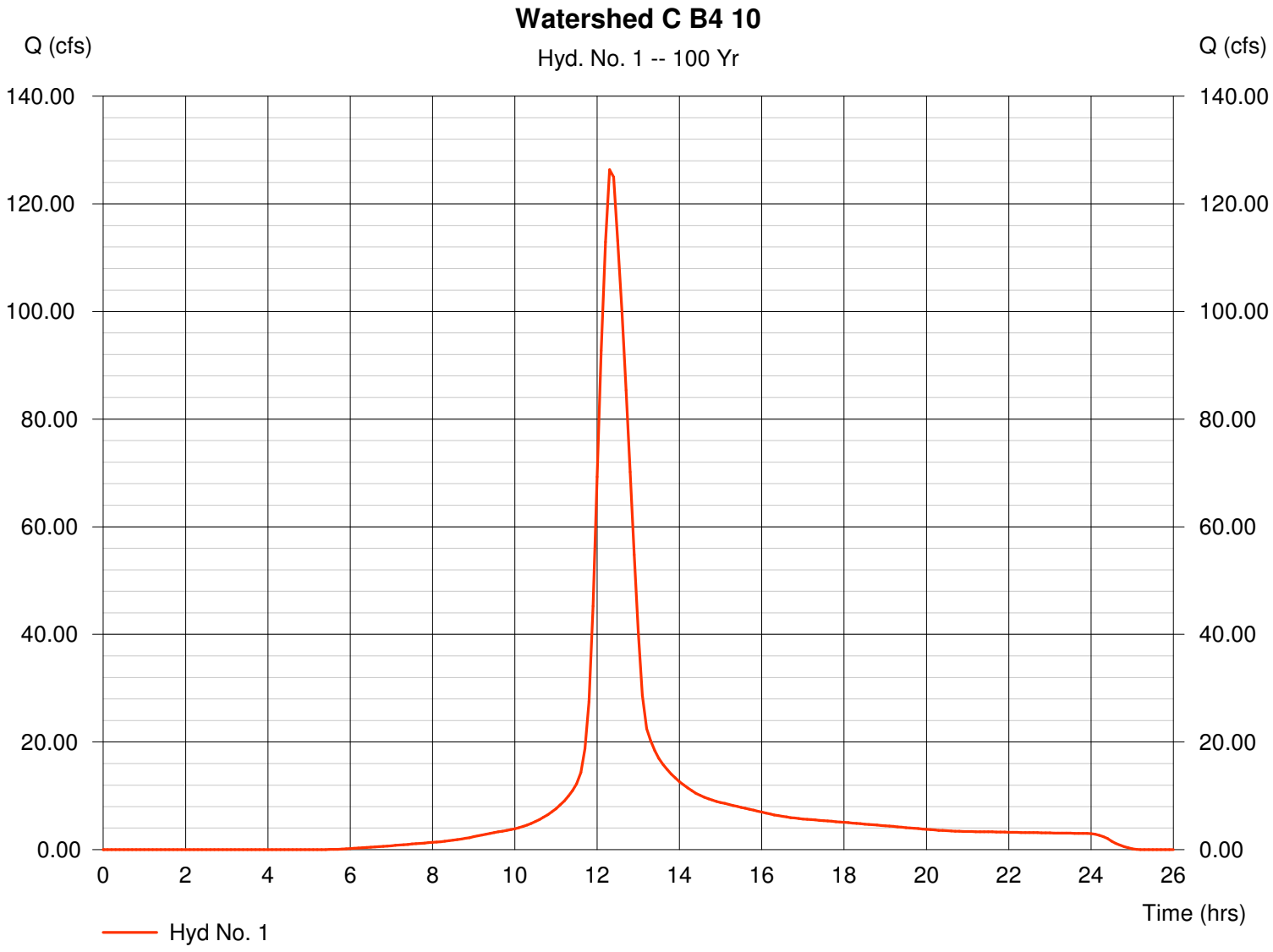
Hydrograph Plot

Hyd. No. 1

Watershed C B4 10

Hydrograph type	= SCS Runoff	Peak discharge	= 126.32 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 36.910 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 48.70 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 710,353 cuft



Hydrograph Plot

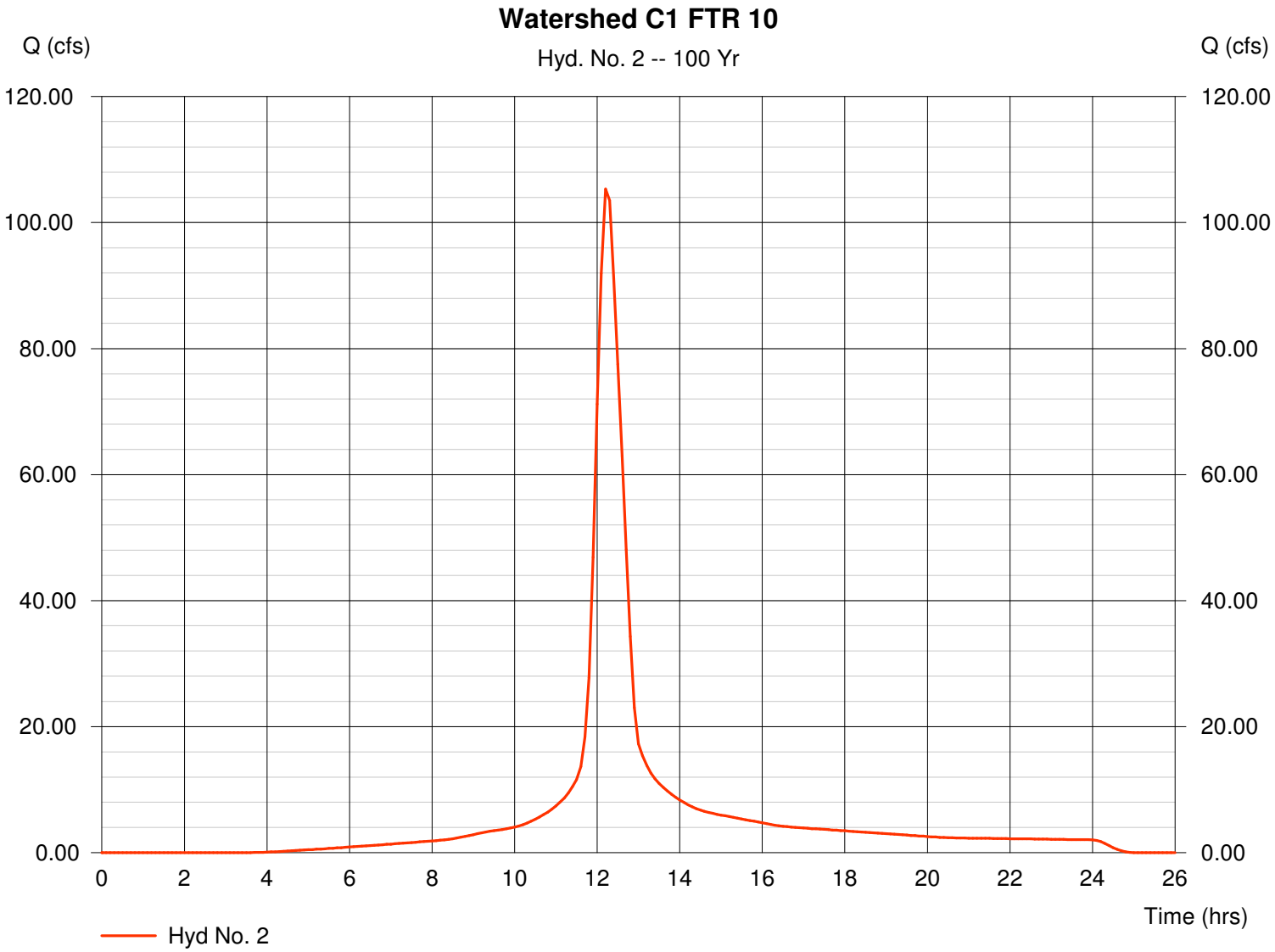
Hydraflow Hydrographs by Intelisolve | Friday, Sep 29 2006, 11:51 AM

Hyd. No. 2

Watershed C1 FTR 10

Hydrograph type	= SCS Runoff	Peak discharge	= 105.33 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 23.080 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 37.60 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 540,432 cuft



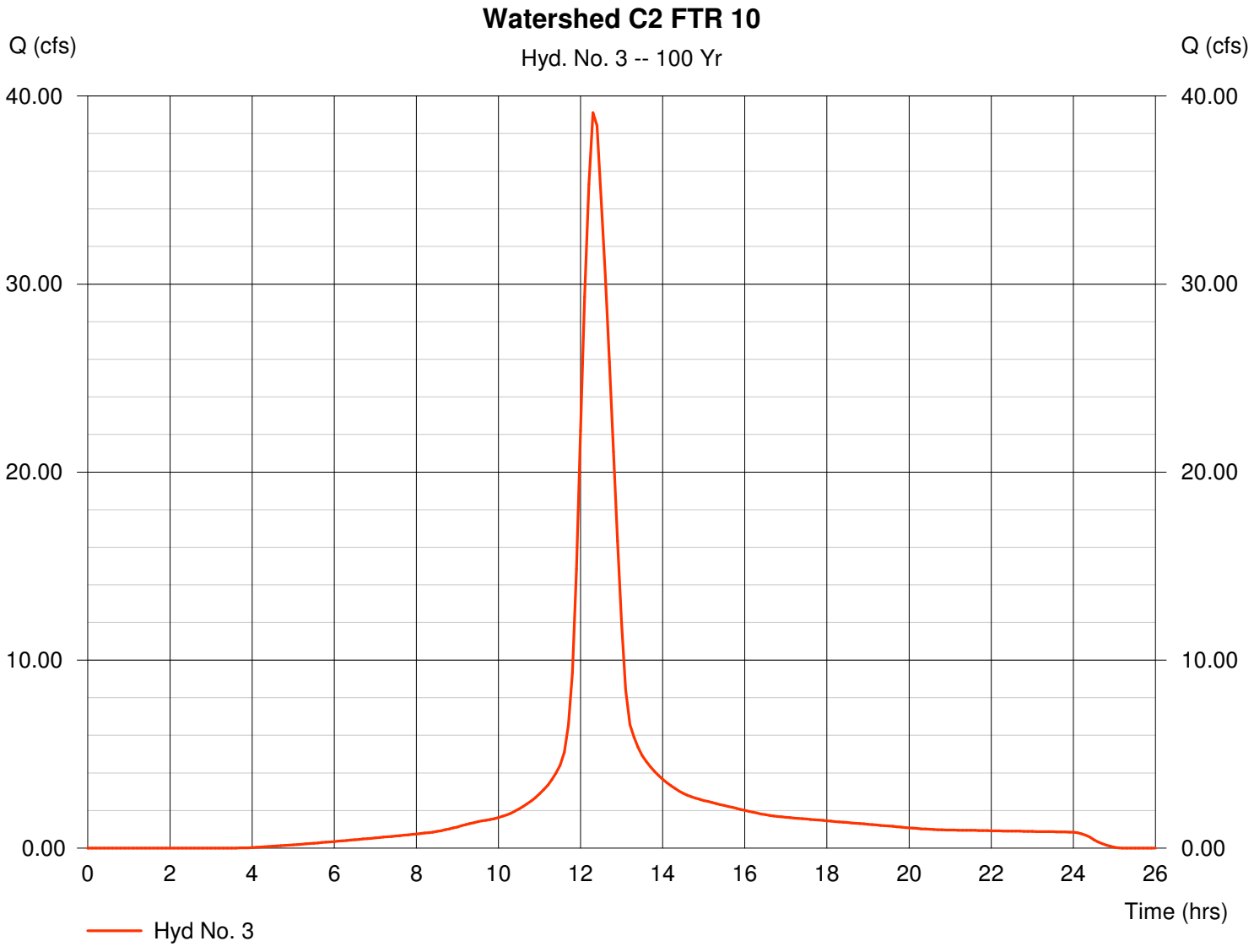
Hydrograph Plot

Hyd. No. 3

Watershed C2 FTR 10

Hydrograph type	= SCS Runoff	Peak discharge	= 39.11 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 10.120 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 44.70 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 224,041 cuft



Hydrograph Plot

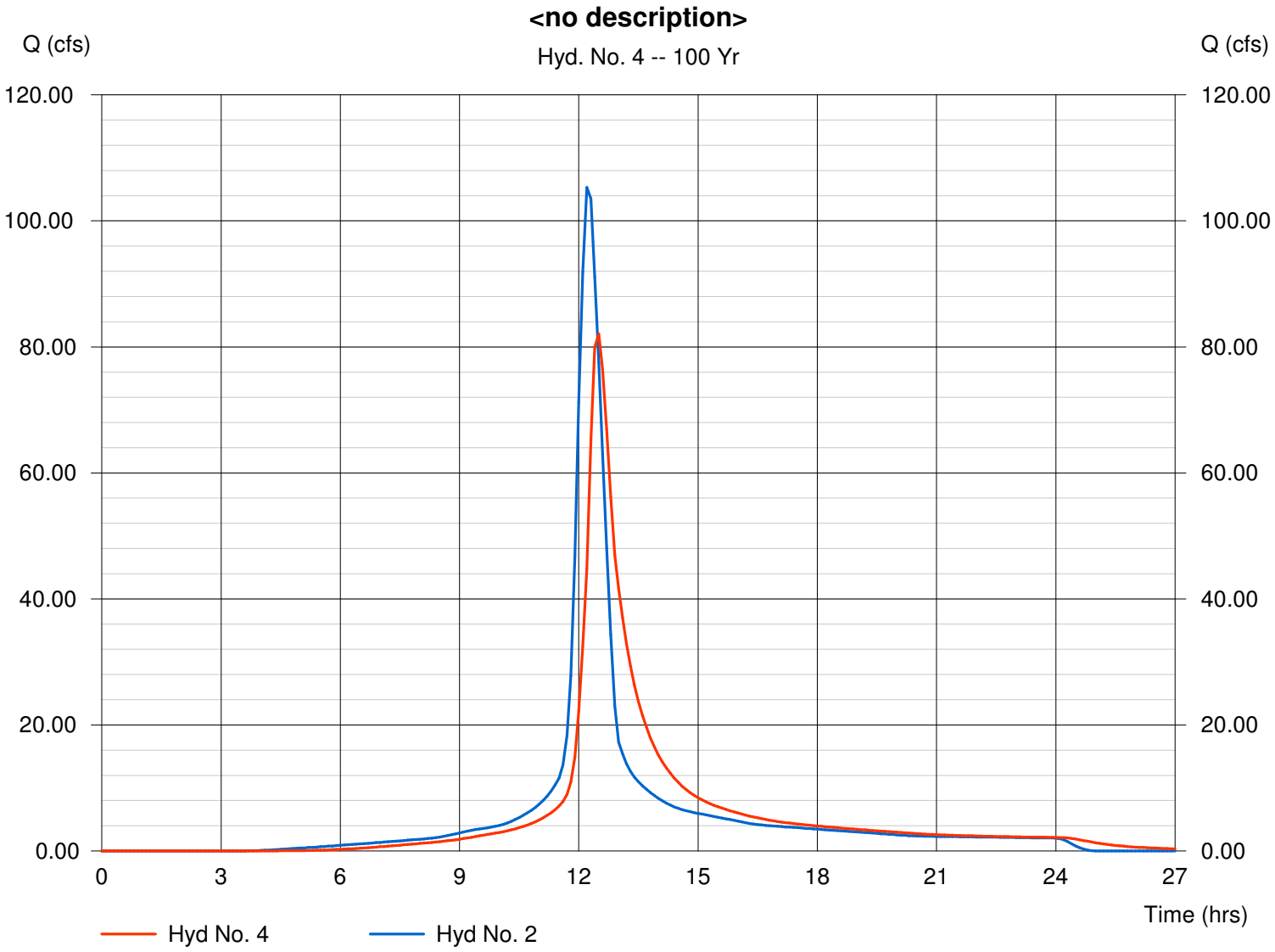
Hydraflow Hydrographs by Intelisolve | Friday, Sep 29 2006, 11:51 AM

Hyd. No. 4

<no description>

Hydrograph type	=	Reservoir	Peak discharge	=	82.04 cfs
Storm frequency	=	100 yrs	Time interval	=	6 min
Inflow hyd. No.	=	2	Max. Elevation	=	1367.53 ft
Reservoir name	=	Conceptual at Watershed C	Max. Storage	=	128,061 cuft

Storage Indication method used. | Hydrograph Volume = 540,413 cuft



Pond Report

Pond No. 1 - Conceptual at Watershed C

Pond Data

Bottom LxW = 175.0 x 200.0 ft Side slope = 6.0:1 Bottom elev. = 1364.50 ft Depth = 5.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1364.50	35,000	0	0
0.25	1364.75	36,134	8,891	8,891
0.50	1365.00	37,286	9,177	18,069
0.75	1365.25	38,456	9,467	27,536
1.00	1365.50	39,644	9,762	37,298
1.25	1365.75	40,850	10,061	47,359
1.50	1366.00	42,074	10,365	57,725
1.75	1366.25	43,316	10,673	68,398
2.00	1366.50	44,576	10,986	79,384
2.25	1366.75	45,854	11,303	90,687
2.50	1367.00	47,150	11,625	102,313
2.75	1367.25	48,464	11,951	114,264
3.00	1367.50	49,796	12,282	126,546
3.25	1367.75	51,146	12,617	139,163
3.50	1368.00	52,514	12,957	152,121
3.75	1368.25	53,900	13,301	165,422
4.00	1368.50	55,304	13,650	179,072
4.25	1368.75	56,726	14,003	193,075
4.50	1369.00	58,166	14,361	207,436
4.75	1369.25	59,624	14,723	222,160
5.00	1369.50	61,100	15,090	237,250

Culvert / Orifice Structures

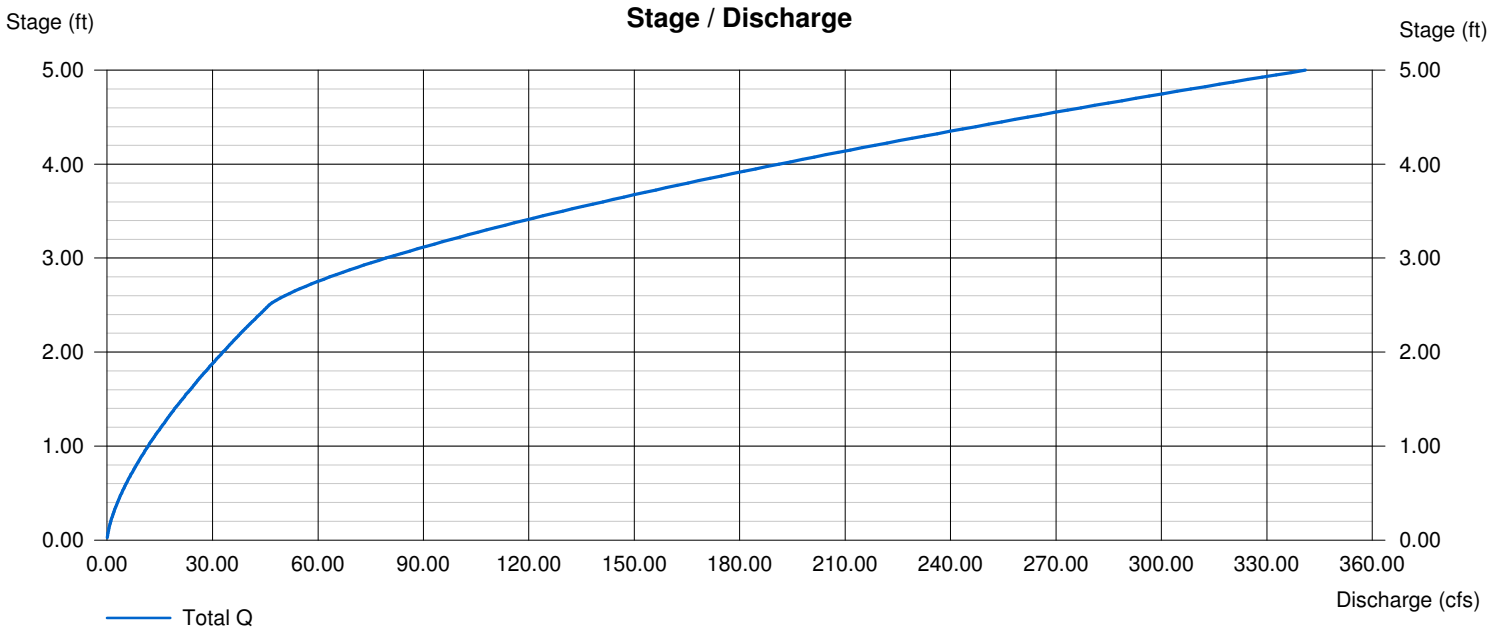
	[A]	[B]	[C]	[D]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.50	16.00	0.00	0.00
Crest El. (ft)	= 1364.50	1367.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	0.00	0.00
Weir Type	= Rect	Rect	---	---
Multi-Stage	= No	No	No	No

Exfiltration = 0.000 in/hr (Wet area) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.



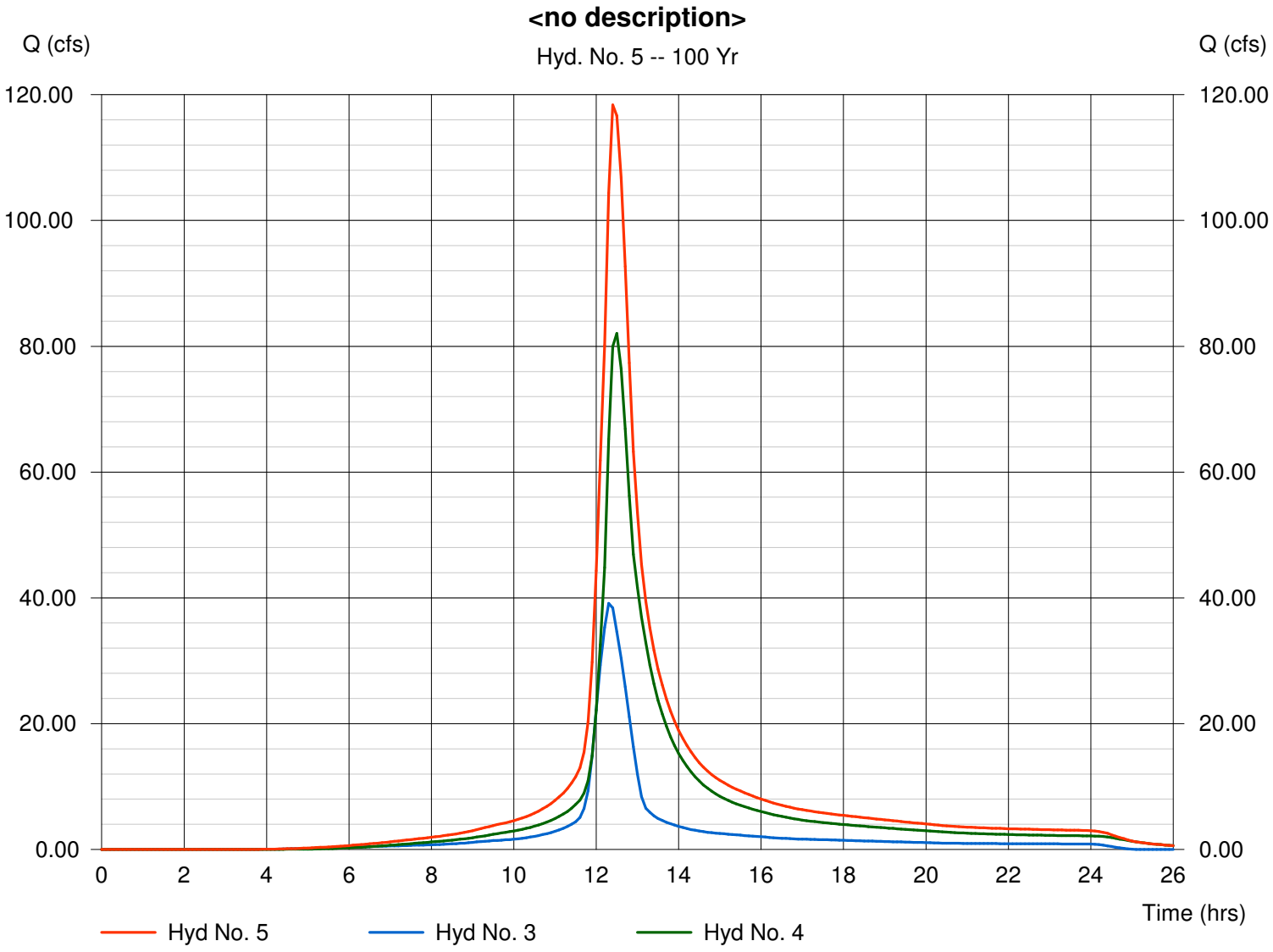
Hydrograph Plot

Hyd. No. 5

<no description>

Hydrograph type	= Combine	Peak discharge	= 118.37 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Inflow hyds.	= 3, 4		

Hydrograph Volume = 764,454 cuft



Legend

Hyd.	Origin	Description
1	SCS Runoff	Watershed D B4 10
2	SCS Runoff	Watershed D FTR 10

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	-------	-------	15.65	-------	24.38	30.30	-------	-------	52.87	Watershed D B4 10
2	SCS Runoff	-------	-------	12.16	-------	17.65	21.26	-------	-------	34.43	Watershed D FTR 10

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	15.65	6	738	79,347	----	------	------	Watershed D B4 10
2	SCS Runoff	12.16	6	738	68,256	----	------	------	Watershed D FTR 10

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	24.38	6	738	122,616	----	------	------	Watershed D B4 10
2	SCS Runoff	17.65	6	738	99,193	----	------	------	Watershed D FTR 10

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	30.30	6	738	152,380	----	------	------	Watershed D B4 10
2	SCS Runoff	21.26	6	738	119,936	----	------	------	Watershed D FTR 10

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	52.87	6	732	266,255	----	------	------	Watershed D B4 10
2	SCS Runoff	34.43	6	738	197,253	----	------	------	Watershed D FTR 10

Hydrograph Plot

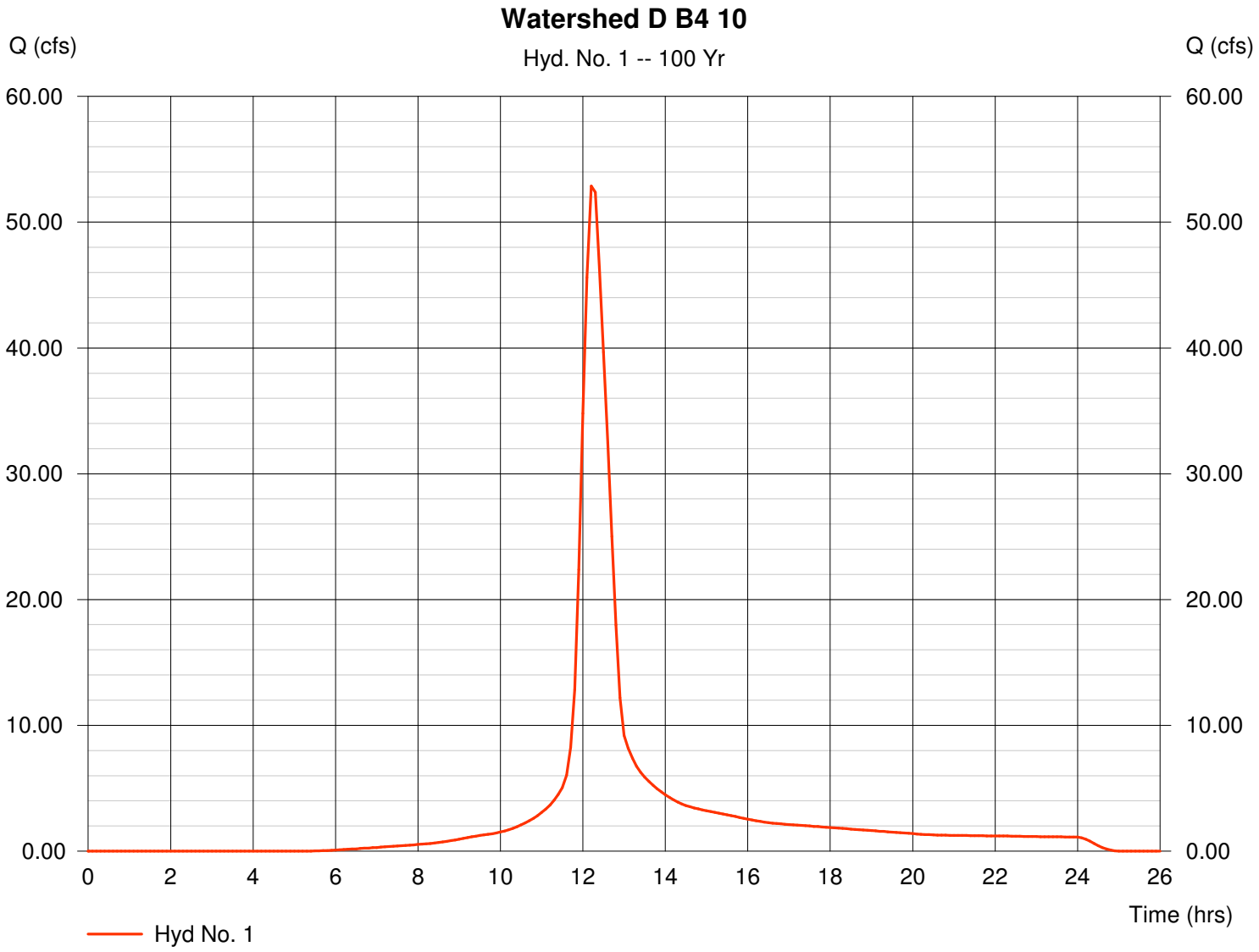
Hydraflow Hydrographs by Intelisolve | Friday, Sep 29 2006, 11:57 AM

Hyd. No. 1

Watershed D B4 10

Hydrograph type	= SCS Runoff	Peak discharge	= 52.87 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 13.080 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 39.20 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 266,255 cuft



Hydrograph Plot

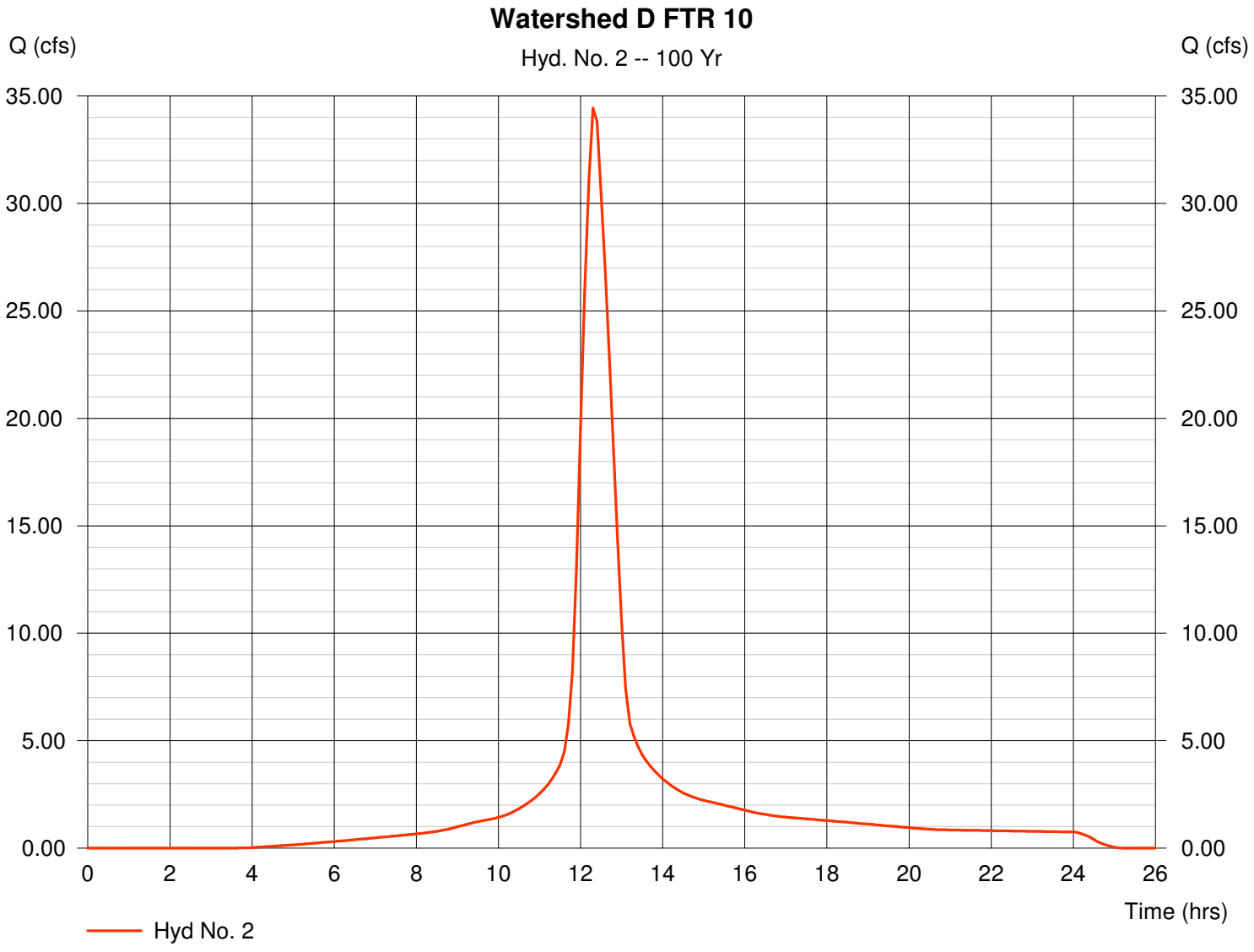
Hydraflow Hydrographs by Intelisolve | Friday, Sep 29 2006, 11:57 AM

Hyd. No. 2

Watershed D FTR 10

Hydrograph type	= SCS Runoff	Peak discharge	= 34.43 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 8.910 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 41.60 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 197,253 cuft



Legend

Hyd.	Origin	Description
1	SCS Runoff	Watershed E Pre-Project
2	SCS Runoff	Watershed E Post-project

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	-------	-------	11.68	-------	18.20	22.62	-------	-------	39.46	Watershed E Pre-Project
2	SCS Runoff	-------	-------	10.53	-------	14.13	16.47	-------	-------	24.93	Watershed E Post-project

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	11.68	6	738	59,232	----	------	------	Watershed E Pre-Project
2	SCS Runoff	10.53	6	732	54,643	----	------	------	Watershed E Post-project

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	18.20	6	738	91,532	----	------	------	Watershed E Pre-Project
2	SCS Runoff	14.13	6	732	74,385	----	------	------	Watershed E Post-project

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	22.62	6	738	113,750	----	------	------	Watershed E Pre-Project
2	SCS Runoff	16.47	6	732	87,358	----	------	------	Watershed E Post-project

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	39.46	6	732	198,757	----	------	------	Watershed E Pre-Project
2	SCS Runoff	24.93	6	732	134,803	----	------	------	Watershed E Post-project

Hydrograph Plot

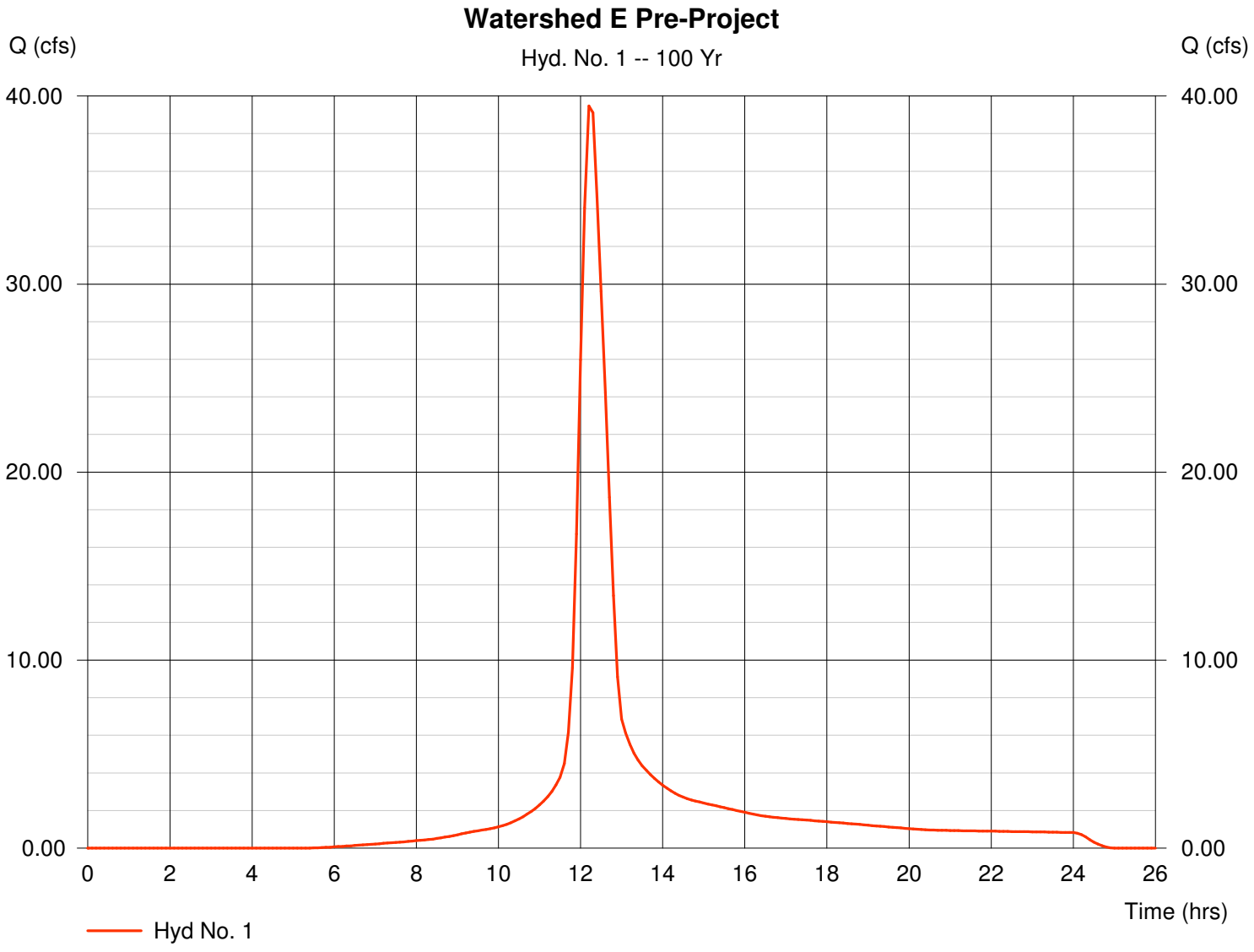
Hydraflow Hydrographs by Intelisolve | Friday, Sep 29 2006, 1:5 PM

Hyd. No. 1

Watershed E Pre-Project

Hydrograph type	= SCS Runoff	Peak discharge	= 39.46 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 9.764 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 36.70 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 198,757 cuft



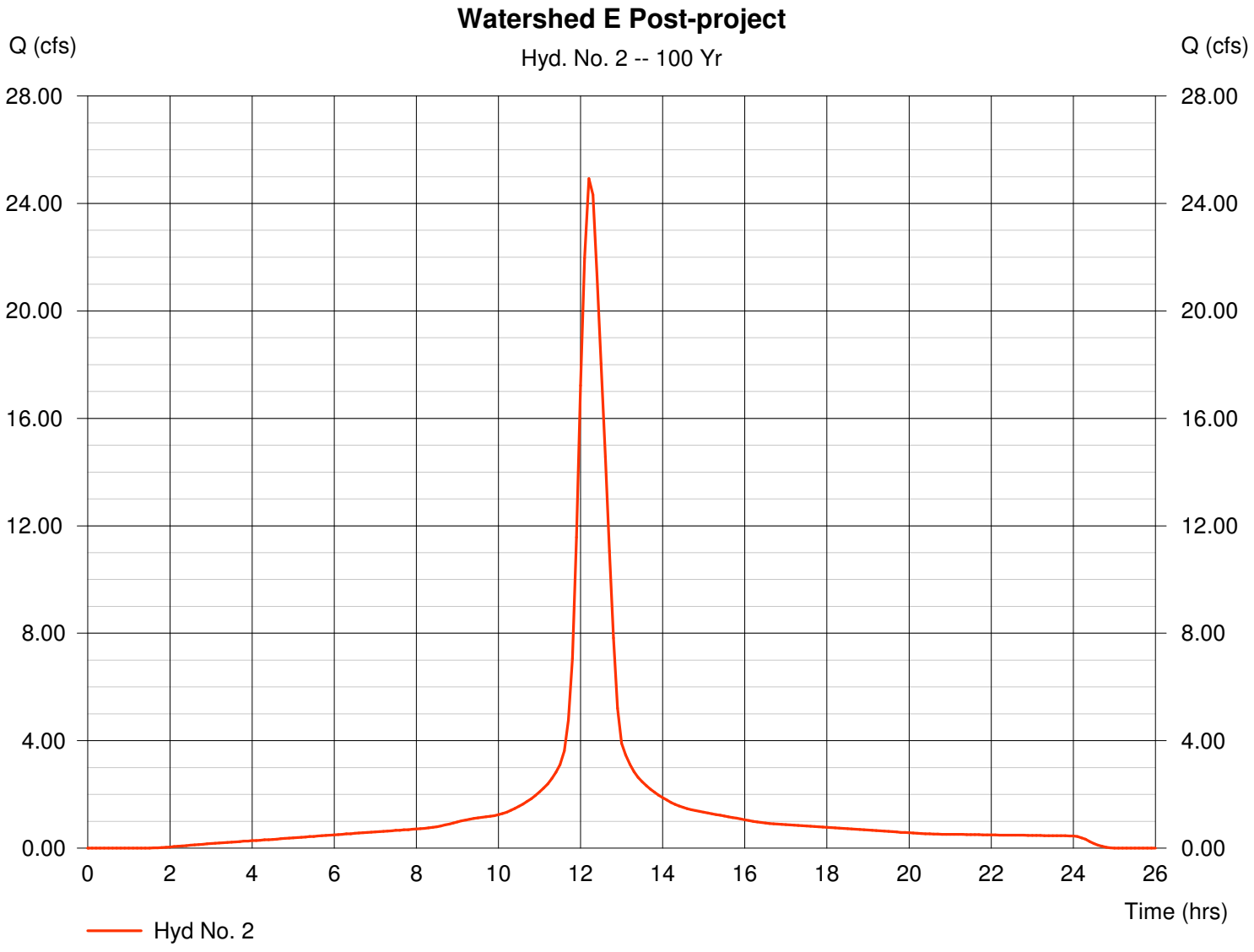
Hydrograph Plot

Hyd. No. 2

Watershed E Post-project

Hydrograph type	= SCS Runoff	Peak discharge	= 24.93 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 5.000 ac	Curve number	= 95
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 32.50 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 134,803 cuft

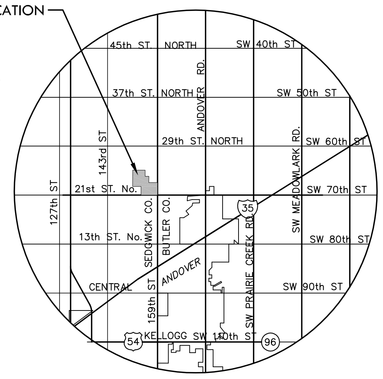


Appendix G
Preliminary Lot Grading Plan

Center Sec. 1, T27S, R2E, 6th P.M. Fnd. ½" pipe

NE. Cor., SE. ¼, Sec. 1, T27S, R2E, 6th P.M. Fnd. stone

PLAT LOCATION



VICINITY MAP

LEGEND

- 6IN - CONIFEROUS TREE & DIAMETER
- 3IN - DECIDUOUS TREE & DIAMETER
- SN - SIGN
- PP - POWER POLE AND GUY ANCHOR
- ELEC BOX - ELECTRIC BOX
- LP - LIGHT POLE
- FH - FIRE HYDRANT
- WV - WATER VALVE
- WM - WATER METER
- SECTION CORNER
- BM - BENCHMARK
- EASEMENT
- BUILDING SETBACK
- FENCE
- STORM SEWER PIPE
- WATER LINE
- SANITARY SEWER LINE
- GAS LINE
- GAS PIPELINE
- TELEPHONE LINE
- UGT - UNDERGROUND ELECTRIC LINE
- UGE - UNDERGROUND ELECTRIC LINE
- OHE - OVERHEAD ELECTRIC
- FOC - FIBER OPTIC CABLE I

GRAYSTONE CIR.
GRAYSTONE
MAINS GATE ST.
CHELMSFORD CT.
CHELMSFORD
CAMDEN CHASE
MONARCH LANDING CIR.
BOXTHORN CT.
BOX THORN CT.
BOX THORN ST.
MONARCH LANDING CT.
MONARCH LANDING
BOXTHORN
24th ST.
21st ST. N.
159th ST. E
GRAVEL RD.
RESERVE "A"
RESERVE "B"
RESERVE "C"
RESERVE "D"
RESERVE "E"
RESERVE "F"
RESERVE "G"
RESERVE "H"
RESERVE "I"
RESERVE "J"
RESERVE "K"
RESERVE "L"
45 School Parcel 17.58 acres
19 16.4 acres
Dense Trees
no buildings
Pond
Ditch
Hedge Row
Trees
8" PRESSURIZED PIPELINE
24" CMP
ASPHALT

SW. Cor., SE. ¼, Sec. 1, T27S, R2E, 6th P.M. Fnd. thimble

SE. Cor., SE. ¼, Sec. 1, T27S, R2E, 6th P.M. Fnd. ¾" pipe w/ Moehring cap over thimble

NORTH

SCALE: 1" = 100'

100 0 100 200

J:\CIVIL\06201\DWG\Grad\06201GP

MKEC ENGINEERING CONSULTANTS, INC.
411 N. WEBB ROAD
WICHITA, KS. 67206
316 - 684 - 9600

MONARCH LANDING ADDITION
PROJECT NAME

APPENDIX G GRADING PLAN
SHEET TITLE

TM	KWS/CMJ	GJA
DESIGN BY:	DRAWN BY:	CHECKED BY:

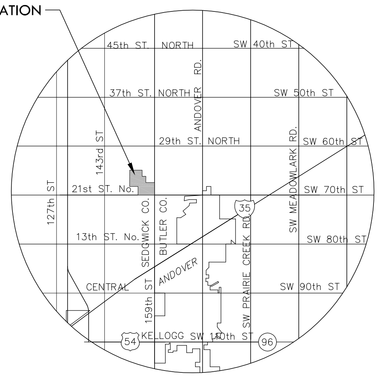
SEPTEMBER 2006	06201	1 / 1
DATE	JOB NO.	SHEET/OF

Appendix H
Preliminary Drainage and Utility Plan

Center Sec. 1, T27S, R2E, 6th P.M.
Fnd. ½" pipe

NE. Cor., SE. ¼, Sec. 1, T27S, R2E, 6th P.M.
Fnd. stone

PLAT LOCATION



VICINITY MAP

LEGEND

- 6IN - CONIFEROUS TREE & DIAMETER
- 3IN - DECIDUOUS TREE & DIAMETER
- SN - SIGN
- PP - K - POWER POLE AND GUY ANCHOR
- ELEC BOX - ELECTRIC BOX
- LP - LIGHT POLE
- FH - FIRE HYDRANT
- WV - WATER VALVE
- WM - WATER METER
- SECTION CORNER
- BM - BENCHMARK
- EASEMENT
- BUILDING SETBACK
- FENCE
- STORM SEWER PIPE
- W - WATER LINE
- SANITARY SEWER LINE
- G - GAS LINE
- P - GAS PIPELINE
- UGT - TELEPHONE LINE
- UGE - UNDERGROUND ELECTRIC LINE
- OHE - OVERHEAD ELECTRIC
- FOC - FIBER OPTIC CABLE !
- DRAINAGE SUB BASIN
- DRAINAGE BASIN
- FLOW ARROW

C
Area = 34.4

B1
Area = 15.7

B2
Area = 13.1

A1
Area = 25.6

A2
Area = 5.7

A3
Area = 13.8

D
Area = 8.9

E
Area = 5.5

MAIN GATE ST.
DETENTION C
RESERVE "K"
RESERVE "L"
GRAYSTONE CIR.
CHELMSFORD CT.
CHELMSFORD
CAMDEN CHASE
MONARCH LANDING CIR.
24th ST.
GRAYSTONE
BOX THORN CT.
DETENTION B1
RESERVE "J"
BOX THORN ST.
RESERVE "G"
RESERVE "F"
CHELMSFORD CIR.
MONARCH LANDING CT.
BOXTHORN
BOXTHORN CT.
RES. "D"
RES. "C"
RESERVE "E"
DETENTION B2
DETENTION A1
RESERVE "H"
RESERVE "B"
DETENTION A2
MONARCH LANDING
RESERVE "A"
TEMPORARY DRAINAGE DITCHES
School Parcel 17.5± acres
16.4 acres
Dense Trees
no buildings
Pond
Ditch
Trees
Hedge Row
PROP. SWS
8" PRESSURIZED PIPELINE
24" CMP
ASPHALT
21st ST. N.
GRAVEL RD.
159th ST. E.

NE. Cor., SE. ¼, Sec. 1, T27S, R2E, 6th P.M.
Fnd. stone

SW. Cor., SE. ¼, Sec. 1, T27S, R2E, 6th P.M.
Fnd. thimble

SE. Cor., SE. ¼, Sec. 1, T27S, R2E, 6th P.M.
Fnd. ¾" pipe w/ Moehring cap over thimble

POND AREA CALCULATIONS

POND	NP (ft)	100-Year Water Surface Elevation (ft)	100-Year Volume (acre-ft)	AREA @ WSEL 100 (sq. ft)
A1	1366.0	1369.4	3.80	58,500
A2	1365.5	1370.0	1.45	18,500
B1	1366.0	1369.9	4.51	61,000
B2	1364.0	1367.7	0.78	12,600
C	1364.5	1367.5	2.94	50,000

NORTH

SCALE: 1" = 100'

100 0 100 200

J:\CIVIL\06201\DWG\ORING\06201DP

MKEC ENGINEERING CONSULTANTS, INC.
411 N. WEBB ROAD
WICHITA, KS. 67206
316 - 684 - 9600

MONARCH LANDING ADDITION
PROJECT NAME

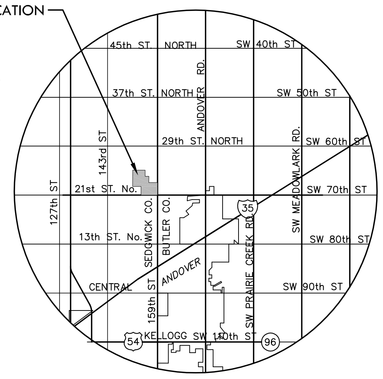
APPENDIX E
DRAINAGE PLAN
SHEET TITLE

TM	KWS	GJA
DESIGN BY:	DRAWN BY:	CHECKED BY:
SEPTEMBER 2006	06201	1 / 1
DATE	JOB NO.	SHEET/OF

Center Sec. 1, T27S, R2E, 6th P.M. Fnd. ½" pipe

NE. Cor., SE. ¼, Sec. 1, T27S, R2E, 6th P.M. Fnd. stone

PLAT LOCATION



VICINITY MAP

LEGEND

- 6IN - CONIFEROUS TREE & DIAMETER
- 3IN - DECIDUOUS TREE & DIAMETER
- SN - SIGN
- PP - POWER POLE AND GUY ANCHOR
- ELEC BOX - ELECTRIC BOX
- LP - LIGHT POLE
- FH - FIRE HYDRANT
- WV - WATER VALVE
- WM - WATER METER
- SECTION CORNER
- BM - BENCHMARK
- EASEMENT
- BUILDING SETBACK
- X — X — FENCE
- STORM SEWER PIPE
- W — W — WATER LINE
- S — S — SANITARY SEWER LINE
- G — G — GAS LINE
- P — P — GAS PIPELINE
- UGT — UGT — TELEPHONE LINE
- UGE — UGE — UNDERGROUND ELECTRIC LINE
- OHE — OHE — OVERHEAD ELECTRIC
- FOC — FOC — FIBER OPTIC CABLE !

Hedge Row
Trees
24th ST.
℄ GRAYSTONE CIR.
℄ MAIN GATE ST.
RESERVE "K"
℄ CHELMSFORD CT.
℄ CHELMSFORD
CHELMSFORD CT.
℄ MONARCH LANDING CIR.
℄ CAMDEN CHASE
℄ GRAYSTONE
BOXTHORN CT.
℄ BOXTHORN CT.
RESERVE "J"
℄ BOXTHORN ST.
RESERVE "G"
RESERVE "F"
℄ CHELMSFORD CIR.
MONARCH LANDING CT.
RESERVE "E"
RESERVE "H"
℄ MONARCH LANDING
45
School Parcel
17.58 acres
RESERVE "A"
℄ 21st ST. N.
℄ BOXTHORN
℄ BOXTHORN CT.
RES. "D"
RES. "C"
RESERVE "B"
℄ 159th ST. E.
GRAVEL RD.
Ditch
Pond
Dense Trees
no buildings
16.4 acres
20
21
8" PRESSURIZED PIPELINE
24" CMP
ASPHALT
PROP. 8" SAN.
PROP. SWS
WTR
PROP.
10' DRNG. & WALL ESMT. UTIL. ESMT.
5' DRNG. & WALL ESMT. UTIL. ESMT.

SW. Cor., SE. ¼, Sec. 1, T27S, R2E, 6th P.M. Fnd. thimble

SE. Cor., SE. ¼, Sec. 1, T27S, R2E, 6th P.M. Fnd. ¾" pipe w/ Moehring cap over thimble

NORTH

SCALE: 1" = 100'

100 0 100 200

J:\CIVIL\06201\DWG\DRNG\06201DUP

MKEC ENGINEERING CONSULTANTS, INC.
411 N. WEBB ROAD
WICHITA, KS. 67206
316 - 684 - 9600

MONARCH LANDING ADDITION
PROJECT NAME

APPENDIX H
UTILITY PLAN
SHEET TITLE

KLA	CMJ	GJA
DESIGN BY:	DRAWN BY:	CHECKED BY:
SEPTEMBER 2006	06201	1 / 1
DATE	JOB NO.	SHEET/OF